The EDISON ELECTRIC INSTITUTE BULLETIN

December 1952

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Nuclear Power's Prospects
Philip Sporn

Prime Task for Electricity on the Farm
B. L. England

Step Up Selling Efforts?
Murray F. Gill

Vacationland Case History
E. M. Huben

A Study of Annual Reports
E. E. Roll

Published Monthly by Edison Electric Institute

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

August, 1951-1952

SOURCE AND DISPOSAL OF ENERGY—MONTH OF AUGUST

	1952	1951	%
GENERATION* (Net)			
By Fuel Burning Plants	25,843,566,000	24,600,527,000	+ 5.1
By Water Power Plants	8,517,576,000	7,803,830,000	+ 9.1
Total Generation	**34,361,142,000**	**32,404,357,000**	**+ 6.0**
Add—Net Imports Over International Boundaries	145,635,000	103,661,000	+40.5
Less—Company Use	113,363,000	112,769,000	+ 0.5
Less—Energy Used by Producer	1,054,709,000	953,507,000	+10.6
Net Energy for Distribution	**33,338,705,000**	**31,441,742,000**	**+ 6.0**
Lost and Unaccounted for	4,557,353,000	4,716,492,000	− 3.4
Sales to Ultimate Customers	**28,781,352,000**	**26,725,250,000**	**+ 7.7**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of August 31			
Residential or Domestic	40,181,786	38,643,775	+ 4.0
Rural (Distinct Rural Rates)	1,692,989	1,645,803	+ 2.9
Commercial or Industrial:			
Small Light and Power	5,621,991	5,519,483	+ 1.9
Large Light and Power	256,934	245,885	+ 4.5
Other Customers	156,644	159,705	− 1.9
Total Ultimate Customers	**47,910,344**	**46,214,651**	**+ 3.7**
KILOWATTHOUR SALES—During Month of August			
Residential or Domestic	6,656,590,000	5,810,288,000	+14.6
Rural (Distinct Rural Rates)	1,060,739,000	1,030,065,000	+ 3.0
Commercial or Industrial:			
Small Light and Power	5,583,491,000	5,011,923,000	+11.4
Large Light and Power	14,097,091,000	13,492,525,000	+ 4.5
Street and Highway Lighting	262,174,000	244,706,000	+ 7.1
Other Public Authorities	674,787,000	668,551,000	+ 0.9
Railways and Railroads:			
Street and Interurban Railways	230,027,000	252,639,000	− 9.0
Electrified Steam Railroads	171,006,000	174,067,000	− 1.8
Interdepartmental	45,447,000	40,486,000	+12.3
Total to Ultimate Customers	**28,781,352,000**	**26,725,250,000**	**+ 7.7**
Revenue from Ultimate Customers	**$512,716,300**	**$469,300,000**	**+ 9.3**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended August 31			
Kilowatthours per Customer	2,119	1,947	+ 8.8
Average Annual Bill	$58.70	$55.10	+ 6.5
Revenue per Kilowatthour	2.77¢	2.83¢	− 2.1

* By Courtesy of the Federal Power Commission.

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The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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CONVENTIONS AND MEETINGS

1952

DECEMBER

1- 2 EEI Prime Movers Committee, Hotel Martinique, New York, N. Y.
1- 2 EEI-AGA General Accounting Committees, Hotel Muehlebach, Kansas City, Mo.
3- 4 EEI Commercial Cooking Committee, Netherlands Plaza Hotel, Cincinnati, Ohio.
3- 4 EEI Commercial Lighting Committee, Netherlands Plaza Hotel, Cincinnati, Ohio
4- 5 EEI Market Development and Electrical Applications Committee, Netherlands Plaza Hotel, Cincinnati, Ohio.
4- 5 EEI Street Lighting Coordination Committee, Netherlands Plaza Hotel, Cincinnati, Ohio.
4- 5 PUAA Region 2 Meeting, Claridge Hotel, Atlantic City, N. J.
8- 9 EEI Industrial Power and Heating Section, Jung Hotel, New Orleans, La.
8- 9 EEI-AGA Accounting Planning Committee, EEI Headquarters, New York, N. Y.
8- 9 EEI Home Service Committee, EEI Headquarters, New York, N. Y.
10-11 EEI Cost Management Program Subcommittee, Sheraton Hotel, Pittsburgh, Pa.
11 IES Council Meeting, New York, N. Y.
11-12 Southeastern Electric Exchange, Personnel Administration Section Meeting, Henry Grady Hotel, Atlanta, Ga.
18 EEI Industrial Relations Committee, EEI Headquarters, New York, N. Y.

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JANUARY

12-13 EEI Accident Prevention Committee, Hotel Muehlebach, Kansas City, Mo.
15 EEI Industrial Relations Committee, EEI Headquarters, New York, N. Y.
15-16 CEA Engineering and Operating Division Meeting, Nova Scotian Hotel, Halifax, N.S.
15-16 PEA Stores Committee, New Castle, Pa.
15-16 EEI Dealer Coordination Committee, Tutwiler Hotel, Birmingham, Ala.
22-23 CEA Sales Division Meeting, General Brock Hotel, Niagara Falls, Ont.
29-30 CEA General Division Meeting, Mont Tremblant Lodge, Que.

FEBRUARY

2- 3 PUAA Region 8 Meeting, Mayo Hotel, Tulsa, Okla.
5 PIP West North Central Regional Meeting, Winona, Minn.
5- 6 PEA Hydraulic Power Committee, Pittsburgh, Pa.
5- 6 PEA Joint Meeting of Electrical Equipment and Relay Committees, Roosevelt Hotel, Pittsburgh, Pa.
5- 6 Missouri Valley Electric Association Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo.
12-13 EEI Transmission and Distribution Committee Meeting, Shoreham Hotel, Washington, D. C.
12-13 PEA Transmission and Distribution Committee, William Penn Hotel, Pittsburgh, Pa.
16 EEI Industrial Relations Committee, Palmer House, Chicago, Ill.
16-17 EEI Electrical Equipment Committee, Jefferson Hotel, St. Louis, Mo.
17 Maryland Utilities Association Annual Meeting, Lord Baltimore Hotel, Baltimore, Md.
19-20 EEI-AGA Accounting Conference Planning Committee, Rochester, N. Y.
19-20 PEA Systems Operation Committee, Philadelphia, Pa.
23-27 CEA Engineering and Operating, Sales, and General Divisions Meeting, Palliser Hotel, Calgary, Alta.
27-28 Controllers Institute of America, Southern Conference, Shamrock Hotel, Houston, Texas.

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MARCH

2- 3 CEA Sales and General Division Meeting, Western Zone, Edmonton, Alta.
2- 6 ASCE National Convention, Hotel Fairmont, San Francisco, Calif.
5- 6 Pacific Coast Electric Association Engineering and Operating Section Conference, Long Beach, Calif.
8-11 NCEA Electrical Industries Meet, Hotel Nicollet, Minneapolis, Minn.
12-13 PUAA Region 5 Meeting, Richmond, Va.
19 EEI Industrial Relations Committee, EEI Headquarters, New York, N. Y.
23-24 IES Canadian Regional Conference, Chateau Laurier, Ottawa, Ont.
23-24 NCEA Accounting Conference, Dyckman Hotel, Minneapolis, Minn.
23-24 Southeastern Electric Exchange 20th Annual Conference, Boca Raton Hotel, Boca Raton, Fla.
26-27 Oklahoma Utilities Association Convention, Tulsa Hotel, Tulsa, Okla.
30-Apr. 2 EEI 19th Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

APRIL

8- 9 Pacific Coast Electric Association Administrative Services Section Conference, Phoenix, Ariz.
8-10 Missouri Valley Electric Association Engineering Conference, President Hotel, Kansas City, Mo.
12-14 IES Southwestern Regional Meeting, Hotel Baker, Dallas, Texas.
16 EEI Industrial Relations Committee, in conjunction with Personnel Section of Ohio Electric Institute, Netherlands Plaza Hotel, Cincinnati, Ohio
16-17 Southeastern Electric Exchange Engineering and Operating Section Conference, Edgewater Park Hotel, Edgewater Park, Miss.
20-22 National Conference of Electric and Gas Utility Accountants, Sherman Hotel, Chicago, Ill.
21 NCEA Accident Prevention Committee, Dyckman Hotel, Minneapolis, Minn.
21-23 Oklahoma Utilities Association, Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.
22 NCEA Distribution and Equipment Engineering Meeting, Dyckman Hotel, Minneapolis, Minn.
23-24 PEA Meter Committee, Hagerstown, Md.
23-24 IES Pacific Northwest Regional Conference, Multonomah Hotel, Portland, Ore.
24-25 North Central Electric Association, South Dakota All-Electrical Industry Meeting, Ward Hotel, Aberdeen, S. Dak.
26-28 Rocky Mountain Electrical League Annual Spring Conference, Shirley Savoy Hotel, Denver, Colo.

MAY

1- 2 Controllers Institute of America, Pacific Coast Conference, Hotel Ambassador, Los Angeles, Calif.
3- 6 EEI Purchasing and Stores Committee Annual Meeting, Hotel Statler, Detroit, Mich.
7- 8 PEA Industrial Sales Conference, Galen Hall, Wernersville, Pa.
7- 8 PUAA Annual Convention, Chase Hotel, St. Louis, Mo.
12-13 PEA Electrical Equipment Committee, Edison Building of Philadelphia Electric Co., Philadelphia, Pa.
13-15 Pacific Coast Electric Association Annual Convention, Hoberg's, Lake County, Calif.
14-15 PEA Hydraulic Power Committee, York, Pa.
14-15 PEA Transmission and Distribution Committee, Skytop, Pa.

JUNE

1 EEI Industrial Relations Committee, in conjunction with EEI Annual Convention, Atlantic City, N. J.
1- 3 EEI 21st ANNUAL CONVENTION, ATLANTIC CITY, N. J.

The EDISON ELECTRIC INSTITUTE
BULLETIN

Nuclear Power's Place in U. S. Electric Power Supply—Present and Prospective

Philip Sporn
President, American Gas and Electric Company

An address before the National Industrial Conference Board, New York, N. Y., October 16, 1952

RECENTLY there has been a new optimism about prospects for nuclear power. There is justification for this optimism, but it is important to know exactly what it signifies.

At the outset, it is necessary to re-emphasize the elementary point that nuclear energy, if and when it can be utilized to produce electric power economically, will merely provide a new form of fuel. It, and the reactor producing it, will thus take the place of the boiler side of a thermal electric generating station. The conventional steam turbines and all the rest of the power system from that point on will still be necessary, as at present. What we hope for, therefore, in attempting to perfect nuclear energy is primarily to reduce the cost in one of the elements of power production, namely, fuel.

Cheapening Fuel Cost

Even though fuel is but one of a number of vital elements, it is, of course, extremely important. Fuel represents a large portion of the production costs and also of the over-all costs of thermal generated power today. And if the more optimistic ideas as to breeding—and associated chemical processes—can be realized, the fuel cost could be reduced by nuclear reactors to perhaps 10 per cent of what is experienced in a conventional steam boiler.

I need to emphasize further that this prospect of a radical cheapening in fuel cost for power through nuclear energy is still only a hope. During recent years there has never been any real question as to the technical or mechanical feasibility of using nuclear energy to provide the fuel for electric power. The only serious question has been, and still is, one of economic feasibility, that is, whether or not nuclear energy can be produced cheaper than conventional power or at least at a comparable cost.

Until a short time ago, it was customary to speak of nuclear power stations as something to be expected in a matter of "decades." This has meant that it was not believed that economic feasibility could be realized in a lesser time. It is against the background of these views of the recent past that we need to ascertain the meaning of the new mood of optimism which is currently finding expression.

What does this optimism really reflect insofar as prospects for nuclear power are concerned and in what way does it reject or qualify the views of a little while ago?

First, it reflects natural satisfaction over the submarine with a nuclear reactor as part of its propulsion equipment that will soon be an accomplished fact.

Second, it reflects the fact that substantial and rewarding work looking toward the development of power as a byproduct of producing plutonium is being done. In this work a number of highly competent private industrial concerns are actively collaborating with the Atomic Energy Commission and with one another, and they are utilizing some of their most skilled personnel and their own funds in the undertaking.

Finally, the optimism reflects the encouraging experience that AEC is beginning to get in connection with the operation of a number of its experimental reactors. These reactors, which have only recently been completed, are now being used to increase the scope of our knowledge of a number of important phases of reactor technology.

Nuclear Powered Submarine

These developments deserve closer examination to measure their full significance. On June 14 of this year, the keel was laid for the first nuclear powered submarine. Its hull is being built by the Electric Boat Division of General Dynamics Corp. Its reactor power plant is being developed and will be built by the Westinghouse Electric Corp., working jointly with the Argonne National Laboratory. In due course the submarine and propulsion equipment with a nuclear power plant will be completed. No one who has been permitted to come into close contact with this project has any doubt that the undertaking will be highly successful. Other projects for the propulsion of submarines and airplanes are currently in progress under the auspices of AEC or the Defense Department.

There is no material difference between the conventional fuel-powered plant driving a submarine or a carrier and a central station plant of about the same size. If nuclear plants for the propulsion of a submarine are

feasible, why is it not possible to use the same kind of plant for the generation of central station power? There is no reason except the matter of economics. It simply is not possible in the present state of technology to design and construct nuclear reactors that would produce a unit of electric energy for commercial purposes at anywhere near the same cost as conventional fuels. Progress with military projects like the submarine are encouraging as concrete demonstrations of achievement and because they can teach us things which may be relevant to ultimate civilian applications of atomic energy. But they cannot be thought of as too closely connected with the problem of civilian application.

Electric energy for military craft might be acceptable where the cost ranged from two cents even to $1.50 per kilowatthour. In order to begin to be of interest for civilian use competitive with other sources of electric power, costs must be substantially under one cent per kilowatthour. I am not taking into account the perhaps relatively immediate prospects for using nuclear power for civilian purposes in remote areas where conventional fuel is unavailable.

Unsolved Technical Problems

The unsolved problems which make nuclear power so costly are quite technical and I shall merely deal briefly with a number of them. There is the metallurgical problem of finding materials capable of standing the high temperatures needed in equipment for the modern thermal system of power generation, while, at the same time, being subject to neutron and other radiation bombardment. There is the problem of heat transfer systems operating under the limitations imposed by high temperatures needed for efficiency, whereas high temperatures may be bad for the safety of the reactor. There is the problem of chemical processing of radiated materials, and there is the problem of disposal of the large quantities of radioactive wastes — fission products —which will accumulate in the course of processing the nuclear fuels.

All of these complications add greatly to the difficulties and to the cost of producing heat in a form that can be utilized by the heat engine, a steam turbine or a gas turbine, to name the two most likely mechanical forms of that engine. An evaluation of the final cost of producing a unit of energy, in the light of these complications, leads to the conclusion that under present conditions a plant using nuclear fuel — assuming such fuel could be made available under the pressing military needs of today— will be far more expensive than the same unit of energy produced by conventional fuels, coal or gas or oil.

I mentioned previously the developments looking toward production of power as a byproduct of plutonium. How significant are such developments as a means of bringing cost of power more closely in line with power from conventional sources?

Nuclear reactors in producing fissionable material also produce heat. At the Hanford reactors, for example, fissionable material in the form of natural uranium containing a small fraction of U-235 is utilized to produce another fissionable material, plutonium, which is then made into bombs. In that process a great deal of heat is generated. But the heat is rejected to the Columbia River, the primary purpose of the reactor being to produce plutonium.

There is right now great military need for more plutonium, evidenced by the tremendous building program at Savannah River and the over $400,000,000 expansion at Hanford. Obviously, if it were technically possible to so modify the plutonium reactor operation that the heat now wasted were put to use to generate energy, the net effect might be to get the by-product power at an attractive cost. This might be accomplished —in a manner familiar to us in ordinary by-product operations—by using the present cost of plutonium to the government as a base, crediting the whole operation with the full amount of that value and thus obtaining electric power at a cost that would be in line with power produced by conventional fuels. One might also credit the whole plutonium process with the ordinary commercial value of the heat energy used to produce electric power and thus obtain a material reduction in the cost of producing plutonium.

In this way, power as a by-product of plutonium could afford an exciting prospect for early development of nuclear energy on a substantial scale. But this statement of the situation should also make clear that such an operation is likely to remain exceptional for the reason that it would have to be underwritten by a long-term government guaranty of dubious soundness.

A few words are necessary to explain this conclusion. Feasibility in development along this route depends upon the availability of a continuing market for plutonium because the economics of the power is inextricably linked with sale of plutonium. As far as we can now tell, a market for plutonium means a government market for the metal to make stockpile bombs. If the market for plutonium ceases or contracts, the value of the power becomes questionable unless it has been guaranteed by a long-term government underwriting which would persist regardless of the sale of the metal upon which the economics of the by-product depends. The difficulty of assuring a permanent market for plutonium is evidenced by the recent statement of AEC Chairman Gordon Dean that there will come a time when we can stop our urgent drive to make more and more atomic weapons and sit back, look at our stockpile, and say now we have enough.

By-Product Nuclear Power Plants

Even if this time as envisioned by Mr. Dean is considered to be a good many years off, the contingency to which he has drawn attention must radically affect and limit the development of nuclear power plants as a by-product of the plutonium process. When we plan power plants for commercial use, economics requires that we think of them in terms of a useful life of 25, 30, or even 40 or more years. It is difficult, therefore, to think of by-product nuclear power plants being developed other than on the very exceptional basis of long-term government commitment to buy the plutonium at a fixed price or otherwise to underwrite the project.

Whatever the value and the interest in proceeding with present developments of ideas of such plants, in the end hope for nuclear energy as a more or less permanent economical source of power must rest on the straight power reactor and the breeder reactor. And the optimism of recent months, however justified, has not grown particularly out of any spectacular developments in relation to such reactors. As to them, while we

are certainly ahead of the point where we stood when people were saying several years ago that it would be a matter of "decades" before we had economical power, there is no reason for believing that we are unexpectedly further ahead.

So all of this gratifying experience, actual and in prospect, still leaves us quite far removed from a real solution to the problem of producing nuclear energy economically and of making it contribute significantly to satisfy our over-all requirements for electric energy.

The foregoing résumé is not intended to suggest that the "current optimism" of which Mr. Dean spoke is wrong. I share his observation that a look "into this atomic energy package to see just what there is in it for peace" does reveal today a "brighter picture than it would have revealed as recently as a year or even six months ago." But one of our worst habits is to indulge in wide swings of mood between pessimism and optimism, a disposition that prevents us from having a true perspective. There is certainly room for optimism in the solid achievements of the last year or so. But the achievements have been modest as compared with the ultimate dimensions of the problem. We are entitled to be optimistic, but only in the sense of feeling encouraged because a long and difficult job is at last getting under way. This sense of encouragement should not be mistaken, as it so often is, for the experience of triumph that will only be justified very much later when we are on the home stretch.

Viewed in this perspective, the prospects for nuclear power and the effort that can and should be made to realize them can be related to the general problem of over-all requirements for electric energy and the efforts that must be made to fulfill those requirements.

The study of energy requirements recently completed by the President's Material Policy Commission indicated that the electric requirements of the country will be nearly quadrupled between 1950 and 1975. The report further predicted that the proportion of these needs to be supplied from fuel will substantially increase over 1950. No responsible authority is today suggesting that we shall be able to supply any large proportion of this fuel between now and 1975 by nuclear energy. Whether and to what extent nuclear energy assumes a large role in the long-term picture depends upon the developments that occur in the field in the years immediately ahead. And these developments, even if highly favorable, are not likely to tell us that nuclear energy will solve our power problems of the next 25 years. Rather, even assuming we have good luck, we are likely to learn only that a beginning can be made in the next 25 years which can make significant contributions to economical power supply in still later periods.

If this is a fair description of the prospects for nuclear power, then it becomes clear that we should strive for, on one hand, a healthy balance between the hope and the effort that we invest in nuclear development and, on the other, the hope and the effort that we invest in improving the techniques by which electric energy is produced in conventional means.

Need for Cheaper Coal

The nature of this problem can be illustrated by the situation in respect to coal. We are not alone concerned with fulfilling the expanding requirements for electric energy between today and 1975. We must also supply them as cheaply as possible. The PMPC forecast is that the total energy to be generated in 1975 will rise from the figure of not quite four hundred billion kilowatthours in 1950 to 1,400 billion in 1975; that the percentage of thermal generation will increase from about 75 per cent in 1950 to 80 per cent or higher in 1975, with coal, which supplied about two-thirds of thermal generation in 1950, supplying nearly three-quarters of it in 1975. But the real problem is not going to be to find the large increase in coal that this will call for. The real problem is to find this large quantity of coal on an economical basis.

As the PMPC report and others have pointed out, a number of unfavorable developments have been taking place in the coal industry and, particularly, in that part of the coal industry dedicated to the fuel as distinguished from chemical or metallurgical use. Broadly, these are the loss of the railroad fuel market due to the heavy and still accelerating trend toward dieselization, the loss of the domestic fuel market to liquid fuels—oil and gas—and the rise in the cost of mining coal.

An examination of the changes in price levels at the point of production shows that bituminous coal, the main source of fuel for power plants, suffers badly in comparison with other fuels. In the decade 1940-1950, there was roughly a 45 per cent rise in the price of natural gas, 125 per cent in anthracite, and 150 per cent in crude petroleum. In bituminous coal, the price went up more than 150 per cent. In the same decade the wholesale price index experienced a rise of a little over 100 per cent. Thus, at a time when electric energy requirements are going up rapidly, the proportion of coal used to produce the energy is increasing, and the price of coal, the chief element in the production cost of electricity, is also rising. These are the trends which have been manifesting themselves and with which we must be concerned for the period which the PMPC report took account, the two decades immediately ahead.

These are not sound trends from the standpoint of expanding our energy use, nor from the standpoint of expanding our economy as a whole. But we should not be dismayed by the picture. Our past experience should tell us that we can take steps to overcome these adverse factors. Certainly the experience in electric power supply in the United States over the past several decades should encourage us to believe that we can meet such a problem of rising costs.

The demand for electric power, and the capacity to meet that demand, has doubled on the average every decade for the past 40 years. This has been done while the price of electric service has been kept level or actually has been reduced while the cost of everything else was going up sharply. No better demonstration of the condition of the electric power supply of the United States can be cited than the fact that when the present expansion program of AEC is completed, it will utilize annually a quantity of energy greater than all the energy generated in the year 1950-1951 at all the power stations of the British Electricity Authority serving all of Great Britain, Scotland, and Wales. And this will have been done with an economy substantially in advance of that possible anywhere else in the world.

Thus we look at the immense energy requirements of the United States over the next 25 years against a background of having satisfied increasing requirements of a large order of magnitude in past decades, while keeping costs firmly in check, notably by increasing efficiency in transmission, use of materials, and utilization of fuel. Our job for the future is to repeat these achievements at the same time as we try to press ahead in the whole field of energy, including atomic energy.

I mean particularly to emphasize that while we are pursuing the development of nuclear power—opportunities for reducing fuel costs by resorting to nuclear fuel—we must not overlook any promising opportunities for reducing conventional coal costs. There are such opportunities, and the technical problems which must be solved to realize them seem substantially less difficult and less costly than those confronting us in nuclear power.

Promising Future Developments

Without specifying the details of such a development program for coal, four items of great promise can be readily cited: underground gasification, continuous mining, pipe line transportation, and low-temperature carbonization. At least three of these four are on the threshold of realization. The fourth, underground gasification, is far less advanced. All, if successfully developed, promise material reduction in the cost of coal at the point of use. Underground gasification gives, besides, promise of substantial enhancement of the economical recovery of coal otherwise too difficult to mine.

In short, in budgeting our time, energy, and money for improving our over-all prospects for supplying energy requirements in the most economical way, it is necessary not only to make full allowance for the interesting and attractive investigations in relation to atomic energy but also the extremely important investigations in other fields which promise more immediate returns and on a wider scale.

Here I would like to comment on the narrower question of how we can best assure that we shall make the most of our opportunity to find out whether nuclear power is commercially feasible and, if we determine that it is, how best to facilitate its rapid development.

Facilitating Nuclear Development

Certainly the present program that is being carried out by the Atomic Energy Commission and its contractors and the agencies collaborating with AEC needs to be supported. The research and investigation being carried out by AEC with the help of such tools as the Materials Testing Reactor and the Experimental Breeder Reactor, both of which are now in operation at the National Reactor Station in Idaho, the work of the AEC with the Homogeneous Reactor at Oak Ridge, will all materially lessen the time and reduce the cost of developing successful economic, self-supporting commercial reactors.

It is also highly desirable to continue and expand the present program of survey and study of reactor technology by private industrial groups collaborating with AEC. As I said earlier, these surveys are designed to determine the possibilities of combining plutonium production with power production. While encouragement should be given to explore all promising roads, undoubtedly the path that would seem most promising is the one leading to eventual successful breeding —the production in the course of operating a reactor of more fissionable material than is consumed. For unless a power-producing breeder reactor is finally perfected, we are left with the plutonium process as a source of by-product power, with all the inherent difficulties indicated earlier in this paper.

We need, too, a program of research and development in straight or non-regenerative reactors. This in simple words is a reactor in which fissionable material in separated or concentrated form is utilized to produce heat and thus energy. Here fissionable material is consumed and only energy is produced. Such a program involving military application is well on the road to final realization. The submarine reactor is the prime example. There will be some carry-over of technology from military to land-based civilian application, but I believe that, where as here limitations to direct carry-over are economic, a brand new approach is desirable.

This can be accomplished only by a research program in which the single objective is a non-regenerative reactor for central-station land-based service. This method of approach will have advantages technically and economically. Technically the problem will be concerned with release of the nuclear energy involved in fission in the simplest and most economical manner within the bounds of safety. From the economical standpoint, it will be possible to tell just where matters stand on costs, and it will always be possible to pass valid judgment on the economic worth or justification of the project.

Finally, as a utility executive and with the natural direct interest in his subject which such a position creates, I feel it is important that measures be devised to bring the entire electric utility industry into closer contact with what is going on in this field. I believe that this objective is desirable from the standpoint of the utility system of the country, both the privately owned and the publicly owned. But I think that it is equally of interest to all those in and out of government who are concerned with the successful exploitation of the opportunities for peacetime uses of atomic energy.

Potential Users of Reactors

If nuclear power becomes a commercial reality, the utility systems of the country would be the largest potential users of reactors, just as they are today the largest users of fuel-fired steam boilers. It is the utility industry, therefore, which perhaps more than any other is interested in the prospects for nuclear power. The industry has the same kind of interest in technological developments in this new field that it has always had in the technology of conventional power production.

Electric companies have always kept closely in touch with new developments relating to power production and what they held for the future. This has been a necessity in order that each system could make its plans responsive to the dynamic growth which is characteristic of the industry. The industry has also found that if it was to keep costs down and improve service, it had to participate directly and effectively in promoting advances in technology.

In the field of conventional power production, the utility systems have

been able to make such contributions through their own work and in collaboration with the manufacturers of equipment, the producers of fuel, and research institutions. It is such work which has enabled us in recent years to increase the thermal efficiency of steam plants from about 13 to 40 per cent.

This process of technological development has been one with which all parts of our industry have been in continuous contact. Some members have taken a more active role than others. But continuously, from day to day almost, all members, large and small alike, could put themselves in a position to know and appraise what was going on, and each could decide for itself when and under what circumstances to try out or adopt new ideas. With so many segments of the industry playing a part in technological developments, a variety of approaches to particular problems was assured. And because in this industry we had a tradition, almost as old as our business, of mutual sharing of technical and operating experience, we could always count upon the essential process of cross fertilization among the various different approaches. Always we have found it an important part of the process of technological development that we should profit by the discoveries of all our colleagues, that we should learn from one another's mistakes, and that there should not be any significant interval between acquisition of knowledge by one of us and the sharing of that knowledge among all.

The conditions which I have been describing and which for years have been taken for granted in the power industry have, in my opinion, been indispensable factors in establishing the remarkable record of maintaining and even reducing cost levels at a time when general costs were going up sharply.

All of us are familiar with the reasons why these conditions do not exist today with respect to this important new field of technology. No responsible person complains about the security restrictions and the other special conditions with which, for good reasons of national policy, our government has had to surround the atomic energy program. But, notwithstanding these difficulties which stand in the way, we need to find means of continuing the healthy conditions which have heretofore existed in the electric industry and which have been indispensable to technological progress. At least, if we cannot preserve in this new field exactly those conditions which fostered our progress in the past, we need to find adequate substitutes.

A start in this direction has been made in the survey projects for nuclear reactors, already referred to. These were undertaken and recently completed by four industrial groups, which numbered among their members five of the larger utility systems of the country. Not long ago AEC announced willingness to consider additional study projects along the same lines. But, while these activities represent a start in the right direction, they are seriously restricted by the fact that only a limited number of companies can possibly take part in this kind of work and there is no effective way for the rest of the industry to become intimately and currently informed about it.

Related Problems

We have several related problems: how to bring all the separate units of the industry completely into this new field; how to assure that we shall apply here, consistently with security requirements, the tradition which calls for the fullest exchange and sharing of technical experience so that each segment of the industry can profit by the advances and so that each can contribute to the advances; how to assure the government, which has and will continue to have a dominant voice in this field, the benefit of the full experience of this industry which is so relevant to all things connected with power development. In this last aspect of the problem I am speaking particularly about the need of the atomic energy program to make full use of that body of knowledge and experience which we call utility economics and which has been an important function of the industry's management and engineering personnel in the decisions which have to be made constantly in expanding and maintaining power resources and power networks.

It is worth while to observe that a number of simple approaches are already open to all utility systems in securing a useful introduction to the subject. They can and some of them do send selected employees to the Atomic Energy Commission's Oak Ridge School of Reactor Technology. And recently arrangements have been under way to enable some of the utilities who were not direct participants in the AEC reactor surveys to assign personnel to such surveys so that at least some men in other systems could become educated.

Additional Measures Needed

I feel very strongly, however, that we shall not accomplish our objective of preserving the conditions which have heretofore been favorable to technological progress in our industry if we rely exclusively upon the limited measures which are now available. We need, in addition, instruments and organization which can facilitate our efforts to get current information in the most reliable form concerning the over-all and the detailed aspects of the reactor program. We need instruments and organization which will facilitate our efforts to share experience. We need instruments and organization which will help develop and make effective in our own interest and in that of the atomic energy program the concerted knowledge of the industry.

A year and a half ago a mechanism for assisting in creating such instruments and organization was visualized by the Ad Hoc Committee on Cooperation between the Electric Power Industry and the AEC. That report proposed, among other things, that an Industrial Advisory Committee be set up to create adequate contacts between the atomic energy program and the electric utility systems. We thought that such a committee would help solve the problem of bringing all of the separate units of the industry more completely into this field. By giving broad representation on a geographic basis and by giving adequate representation to both the privately-owned and the publicly-owned power systems, we thought that the industry as a whole could find a forum to express its interest in the subject and make its experience available to the atomic energy program. We thought that such a committee would help assure in this new field the continuation of the tradition which calls for the fullest exchange and sharing of technical experience,

and that such a committee could help the government find means for achieving this objective within the limitations of security requirements. Thus far, unfortunately, neither such a committee nor any adequate substitute for such machinery has been established.

I do not suggest that the device of an industry advisory committee like that proposed by the Ad Hoc group is in itself anything more than another modest measure to add to those already available. But the hope is that through such a committee, broadly representative of the industry as a whole, other and still more effective measures of contact would evolve. At all events, if we are to make the most of our experience and bring to bear in this new field the factors which have promoted technological advance in other fields, we must either find devices of this kind or better devices to accomplish the purpose. As of today, we have only made a small beginning.

In this paper I have tried to discuss the prospects for nuclear power as seen through the eyes of a utility executive, that is to say, one who is concerned with the question because of his responsibility for plans of the system with which he is connected and because of his interest in improvements in the engineering art with which he has been identified for all of his mature years. Others with different points of vantage would perhaps describe the picture in different terms.

I should expect, however, that all would agree that the program we pursue for the development of nuclear power needs to be balanced and must be integrated with the program for meeting our over-all energy requirements. This is not to propose that we should pay less attention to atomic energy but only that we shall make a great mistake if we become so absorbed in it that we overlook things that can be done to improve our shorter-term needs for low-cost energy. I should expect, too, that we would agree that our efforts are most likely to succeed to the extent that we are able to conduct the work under conditions as nearly as possible like those under which our technology in other industrial fields has prospered.

K. B. Crumb

K. B. CRUMB, retired American Gas and Electric Co. executive and former treasurer of the Edison Electric Institute, died on Friday, October 24.

MR. CRUMB

A native of Belvidere, Ill., and a graduate of the University of Wisconsin, Mr. Crumb joined American Gas and Electric in 1909 and served the company until his retirement last year. After holding positions with the Rockford Electric Co., the Muncie Electric Co., and Licking Light and Power Co., all subsidiaries of American Gas and Electric, Mr. Crumb was appointed traveling auditor for A. G. and E. in 1912. He was named general auditor in 1921, assistant treasurer of the Service Corporation in 1943, and treasurer and assistant secretary in 1944, in which position he directed all accounting and office procedure operations for the entire American Gas and Electric system until the time of his retirement.

During his many years in the industry Mr. Crumb was active on committees of the National Electric Light Association and its successor, the Edison Electric Institute, and for five years, from 1946 to 1951, he served capably in his position as treasurer of the Institute.

New Edition of Industry Booklet Provides Comprehensive Survey of Industry Operation

I Want to Know About the Electric Industry, an information booklet of national scope which has attracted a large number of readers both within and outside the industry in previous yearly appearances, has been newly revised and is now published in its 1952-53 edition by the Edison Electric Institute.

In offering a comprehensive survey of the nation's vital electric industry, ranging from the average electric bill of the home customer to the industry's 1952-1955 multibillion-dollar expansion plans and its ability to meet a national emergency, the booklet presents authoritative information going beyond the 27 questions and answers upon which this easy-to-understand publication is based.

For those interested in reading or writing about the electric industry, the booklet, in four previous editions, has demonstrated its value as a convenient reference, with its material derived from such definitive sources as the Institute's statistical publications and those of the Federal Power Commission. The 1952-53 edition makes use of the latest calendar-year data and reflects, as well, recent 1952 developments in estimates of future prospects.

Besides table-and-text coverage of electricity use in industry, agriculture, and home, various aspects of electric industry operation are treated, including sales, income, expenses, capitalization, ownership, employees, fuel consumption, and the relative importance in power supply of the investor-owned electric companies and governmental power agencies.

Because the booklet presents such a clear picture of the electric industry in understandable terms, the previous editions have found wide circulation among individuals and groups outside the industry, as well as among electric company personnel. The 1952-53 edition of *I Want to Know About the Electric Industry* incorporates a newly designed cover and revisions of interior layout and typography, which have been developed to increase the ease with which industry facts and figures may be assimilated by the reader and which should increase the usefulness of the booklet in broadening public knowledge of the nation's power supply.

Making Electricity Do More and Earn More for the Farmer

B. L. England

President, Edison Electric Institute, and President, Atlantic City Electric Company

An address before the Indiana Electric Association, French Lick, Ind., October 8, 1952

WHEN we look to the future and logically extend the technological marvels of today's world, we may well be exhilarated—and perhaps a little frightened—to contemplate a civilization in which the family helicopter has replaced the family car, factories and offices are manned largely by electronic brains, and in which you will be branded an old fogy if you don't feel like going off on a rocket visit to the moon.

About the only thing that will be the same is food, which has sustained and comforted man ever since the cave days when he started on his works of wonder and, unfortunately, of war. But, although the many varieties of eatables may not change, the methods and techniques of providing them must keep pace with progress.

Record-Breaking Food Production

That is where electricity comes in. In America, electric power is practically synonymous with progress and modernity in industry, in the home, and on the farm. To remind Americans that food is synonymous with human existence may seem to stress the obvious, but food comes to us more easily and bountifully than it does in almost any other nation, so we may tend to take it for granted, like the air we breathe.

Our food production is at record-breaking levels demanded by our high standard of living and by defense requirements. It must move even higher in the years to come, if for no other reason than to take care of our country's growth. According to the Department of Agriculture, it is estimated that by 1975 our population may be around 190,000,000, or one-fourth larger than in 1950.

At the same time that food requirements and food production have been climbing, there has been a steady reduction among the producers of the supply. Farmers not so long ago were the dominant numerical group in America and as late as 1920 constituted nearly 35 per cent of the population. Now the census indicates that about 15 per cent of our people are devoting themselves to agriculture. And 90 to 95 per cent of the agricultural commodities moving in trade is produced by only about half the group now listed as farmers.

Mechanization on the farm, particularly the introduction of the tractor, has been a principal factor in increasing the crop-raising ability of one man and has made it possible for the two contradictory trends of increased production and diminishing farm population to continue without causing a crisis in the nation's food supply. But our growth as a nation and our determination to maintain an increasingly high standard of living, whether in peace or in a continuing state of preparedness for war, puts mounting pressure on agricultural productivity. That is why electricity, in its role as a tireless farmhand, is of growing and vital importance to America's farmsteads.

Farm electrification in the first half of this century has made notable progress. The first step, that of getting power to the farmer, is about completed, but the primary task which is now before us is to make electricity do more and earn more for the farmer.

Farm Service Programs

This is a task for which electric companies are admirably suited, a task they can, and, in my opinion, must perform. With a long tradition of leadership in farm electrification, extending back some three decades, electric companies have made effective farm service programs part of their operations. Farm advisors are integral components of company organization, and they cover the farm areas, offering their expert knowledge of agricultural problems and electrical applications for the benefit of the farmer.

But fundamental to electric company farm service programs is a spirit of commercial enterprise. It is the same driving force which was instrumental in bringing about the electric revolution in industry and in the home. There has been a tireless search, ever since the very beginning of the electric industry, for new ways in which to serve home and industry electrically, and, despite the miracles that have been wrought in these fields, no limit is in sight. The possibilities of farm electrification are just as limitless. The commercial aggressiveness of electric companies, applied to the farm field, will not only seek out new farm methods and techniques in cooperation with other interested groups and organizations but will provide the drive needed to get labor-saving and income-producing developments put to work at the earliest opportunity.

Electrical Benefits to Farmer

A farmer who sees prospects of better earnings has incentive to increase his production which, of course, helps the food supply. And prosperous farmers who are sold on the electric way of doing things will continually boost electric company revenues.

Electric service can be used to excellent advantage in cutting down the hard physical labor and tediousness which frequently goes with farm chores, and, further, electricity brings a high living standard to the farm home, equal to or surpassing that of city dwellers. The beckoning attractions of a career in a crowded metropolis, which have drained off many promising young farm people, may appear lustreless indeed when viewed from an electrified farmstead, complete with television, modern kitchen, running water, and year-round air conditioning.

Electricity, then, is a basic answer to "how you're gonna keep 'em down on the farm." Youngsters with vision and intelligence will be able to see how tremendous their farm opportunities actually are, and our farm population, instead of diminishing, will grow and gain new spirit, initiative, and working ability. This infusion of new blood into American agriculture will go far to assure that a good and sufficient food supply will always be available to fuel whatever marvels of human achievement Americans may undertake in the years ahead.

Stimulating Farm Youth Programs

These considerations throw into bold relief the natural responsibility and importance of the electric company's role in stimulating and cooperating with farm youth programs. The well-known 4-H Club movement reaches annually some 2,000,000 girls and boys between the ages of 10 and 21 years, who are members of some 85,000 local clubs. The Future Farmers of America activity, centered around the 400,000 vocational agricultural students in the nation, is another focus for electrical education.

By setting up similar electric programs in cooperation with the many individuals and groups interested in advancing American agriculture, by sponsoring contests, scholarships, and special projects, electric companies can help the young farmer of tomorrow to have the know-how for running his farm profitably, efficiently, and with an ease undreamed-of only short years ago.

In addition, it is by such means as these that we can assure that the native ingenuity, resourcefulness, and hard-working capabilities of today's farm youngsters are brought to bear in the continuing campaign of farm accomplishment which must never cease. From their well-springs of inventiveness and imagination will come new ideas on how electricity can save their hand labor and earn money on the farm, and it will be the persistence and energy of these future farmers which will transform their dreams into fruitful and rewarding reality. We must do everything we can in putting the accent on farm youth so that these promises of the future will be fulfilled.

Electric companies have been concerned with the future of farmers for many years now. In 1911, despite the multitude of problems besetting the industry at that early stage of its development, an electric industry committee on electricity in rural districts produced the first systematic collection of data on the farm use of electricity, and by the early Twenties, the electric companies had completed the ground work necessary for an intensified program of farm electrification. It was in 1923 that the well-known Committee on the Relation of Electricity to Agriculture was formed on a national basis to devote all-out efforts to the problems of farm electrification with the electric companies and the American Farm Bureau Federation taking the lead.

Solutions for all the major obstacles to farm electrification had been found by 1935, and nearly 800,000 farms were being served. With business-managed, free-enterprise activity essentially alone in the field, the way had been cleared for a rapid advance in extending power lines to the farmer, and electric company efforts had been fundamental in bringing to the farmer the realization that electricity was here to stay and could mean a better life and a better living for him.

In 1935, the Rural Electrification Administration was established, and since then the REA and the companies have moved along side by side in making electricity available in rural areas. By the end of this year, 4,840,000 U. S. farms will have electric service, 90 per cent of the 5,382,000 farm total.

However, many thousands of farms have power lines running nearby but are not yet taking service. It is estimated that all but 3 per cent of the nation's occupied farms now either have electric service or have it readily available. At the end of 1952, the electric companies will be serving directly over 2,100,000 of the farms with electricity, and REA cooperatives, who purchase over 50 per cent of their power needs from the companies, will be serving over 2,400,000 farm customers.

In Indiana, some 165,000 farms have electric service, about 99.4 per cent of the total of Hoosier farms. The people in this area have been quick to see the importance of developing applications and techniques which would help the farmer make the best use of his power. For some three decades now, ever since the CREA days, Indiana electric companies have been cooperating in projects and research activities concerned with farm electrification.

A measure of the value of the Indiana electric companies' effort is given by the average annual consumption of their farm customers—3750 kwhr in 1951. Farm customers of the investor-owned companies throughout the nation averaged 3200 kwhr in 1951, where irrigation is not a factor.

Electric company farm customers show a greater annual average use than is shown for farm customers in the country as a whole, both governmental and company. On a national industry basis, average annual farm use in 1951 was 2640 kwhr, more than three times the 775 kwhr averaged in 1931.

This tripling of farm use, while gratifying, is also deceiving, because, during the same period for the industry as a whole, ordinary residential consumption of power showed a similar increase, from an annual average of 580 kwhr in 1931 to about 2000 kwhr in 1951.

The plain implication is that electricity is serving the farmer principally in household applications. This means that an immense field of power utilization in farm tasks is lying fallow before us, waiting to be brought to a rich harvest. Right now electricity can help farming operations in some 200 or more applications, but only about a dozen of these are making widespread contributions at this time.

Kilowatthour Consumption

Heating water, lighting farm buildings, pumping water for livestock, operating milking machines and milk coolers, electric brooders and incubators for baby chicks, feed grinding and feed handling, refrigeration, and pumping for irrigation or drainage are the main farmstead uses, on the basis of kilowatthour consumption.

It is a proven fact that once a farmer has begun to use electricity in one application or another, his usage grows steadily as he realizes more clearly how electricity helps him and he adds more appliances and equipment. This evidence of automatic growth, however, should not encourage us to lean back and let farm electrification grow like Topsy.

Rather, we should be inspired to develop this assured market for the greatest possible benefits, both for our farm customers and ourselves.

The farmer should have expert assistance in tailoring his electrification to the needs of his particular type of operation. Instead of investing in electric equipment on a hit-or-miss basis, he should be helped to coordinate his electrification program so that the applications which will mean the most to him in profits and in time- and labor-saving are put to work as soon as possible. This, in turn, will hasten his ability to continue electrification and, incidentally, will mean that his enthusiasm for electrification will be kept at a higher level and his use of electric service will build up more rapidly.

Business Approach to Farming

In other words, what is required is the same thorough-going type of cooperative approach which the power salesman and the equipment dealer bring to their commercial and industrial promotions in urban areas. Today's successful farmer is as much a businessman as is the manager of practically any urban enterprise, and his electric load-building potential is enormous.

Today, there are dairy and poultry farms using 10,000 to 50,000 kwhr a year compared to the national average of 2640 kwhr. If I may draw on personal experience briefly in Atlantic City Electric's area, where we serve some 8000 farms in the southern part of New Jersey, there are farms using as much as 69,260 kwhr, with average use of 4734 kwhr. This does not include the rather unusual operation of the Seabrook Farms, where a wide variety of vegetables are grown and processed for the frozen-food market and whose annual consumption is on the order of 23 million kwhr.

To cite a living example of how electricity can do more and earn more for the farmer, I would like to describe Anthony Rizotte's farm near Hammonton, N. J., which he has owned for the past 43 years and where he has received electric service for about 39 years. He first used electric service for lighting, later for a refrigerator, then a water system and other small appliances. Since 1932, however, limited manpower and the increased demand for his produce dictated greatly expanded use of electric service, which is now used in the grading and marketing of the fruit and the vegetables produced. For instance, his sweet potato beds are heated in the spring with electric soil heating cable, a cold storage house capable of storing approximately 14,000 bushels of fruit is operated by electric power, and his fruit is graded and polished by electrically driven mechanical means. He states that "if it were not for the electric service, it would be impossible for him to grade and pack the large tonnage of produce that is raised on his farm so economically."

Another mechanical aid made available to him through electric service is a fully equipped farm repair shop. In this shop he is able to take care of necessary repairs to his equipment. There is still need for more appliances on this farm, such as conveying and handling equipment and irrigation. Nevertheless, his annual consumption of energy now amounts to approximately 36,000 kwhr per year, which is double what it was 20 years ago.

A farm like this has a value far beyond its above-average consumption of power. It is the best kind of concrete demonstration that electricity can do more and earn more for the farmer, providing a basis for further improvement of farm electrification patterns and methods, as well as offering convincing arguments to other farm prospects.

Wisconsin Electric Research Farm

In this connection, I would like to mention some of the other ways in which electric companies are helping to provide demonstrations that farm electrification pays off. In Wisconsin, there is the well-known Wisconsin Electric Research Farm, which was established in 1946 by the Agricultural Experiment Station of the University of Wisconsin with the financial aid of the Wisconsin Utilities Association.

This dairy farm goes beyond the installation of standard electrical equipment in standard farm buildings. It is a testing ground where changes in equipment and in building design and arrangement are worked out to take full advantage of the possibilities of electrification.

Professor F. W. Duffee, under whose guidance the farm is conducted, tells us that in 1950 the farm used 44,800 kwhr, which would have cost $900 to $1200 at Wisconsin farm rates. But here, in brief, are some examples of what the farmer received in return. For his 24-cow herd, a silo unloader reduced the time of getting down silage from the ten minutes needed with a pitch-fork to about ten seconds. Clearing the barn with an electric barn-cleaner reduced the time for this operation from 22 minutes to a little over five minutes. Professor Duffee says that one farmer installed a silo unloader and a barn-cleaner for his 60-cow herd and was able to dispense with the services of one hired hand as a result, a savings in labor cost of no mean significance these days.

Additional Benefits

In addition to the benefits of these two applications, a partial listing includes the advantages to be gained from a non-freezing water supply for poultry and animals, artificial hen-house lighting to increase egg production when prices are highest, an electrified farm shop for efficient machinery maintenance, milking machines, heat lamps for pig brooding, an electric feed plant, plus all the comforts and labor-saving devices of the modern farm home. Brief though this summary is, it offers a strong indication of how far we have to go and how important it is to the farmer that we push forward with vigor and imagination.

To emphasize what electricity can do for the farmer, let me mention a few concrete examples of the gains which result from some specific applications.

Here, for instance, is what an electric water system can mean on a farm. The adequate water supply it will provide will enable stock to produce up to one-fifth more meat or gallons of milk. Average egg production increases 8 to 10 per cent when hens have a constant supply of fresh running water. Vegetable crops can be increased 50 per cent, and there are many examples where potatoes will increase 100 per cent in yield if properly irrigated.

Here are some other instances: the milking machine is reported to show savings of from 50 to 65 per cent in time and labor required to milk a herd; the pig brooder reduces losses by about 50 per cent, with an average

of one more pig being raised in each litter; a feed-grinder of one horsepower can grind feed for 50 cows a day and can be equipped to operate semi-automatically, leaving the farmer free for other chores; an electric hay hoist can save the time of one man during hay harvest, a very busy season; and, to indicate the wide range of applications, the poultry "debeaker" is reported to be the only sure cure against cannibalism among barnyard fowl.

In these, and in the multitude of other electrical applications, savings in time and labor and the gains in productivity are translated into dollars and cents of farm income.

We are on the road to what has been called production-line farming, where the farmer will gain a high volume of productivity at low unit cost from crop specialization and a high degree of mechanization. Electric power is absolutely essential to industrial mass production, and it will be no less vital to similar processes in agriculture.

Livestock Production Lags Behind

A farm authority has noted that crop production per man-hour has increased 2¼ times the 1910-1914 level, but livestock production has increased only 1¼ times. Mechanization, particularly the tractor, has brought about this increase in crop production. The fact that livestock production, in one of the world's foremost meat-eating nations, has shown nothing like that improvement gives a hint as to what the possibilities are for the substitution of electricity for human muscle power in chorework and in improved methods for assuring an ample meat and poultry supply for America.

I hope I have succeeded, if only in a limited way, in giving an idea of the comprehensiveness and multitude of approaches inherent in any consideration of farm electrification. In that connection, I am glad to report that electric companies are making significant contributions to a variety of research projects in every part of this nation. A survey by the Edison Electric Institute shows that some 244 investigations or special studies are being carried on as part of 88 separate projects in 30 of the 48 states, as well as in Canada. Each project was set up to study some problem of particular interest to local agriculture, with a view to cutting down labor and building up farm income.

These efforts to help the farmer prosper form an important phase of the over-all field of area development, which is attracting growing electric company interest. Unlike manufacturing plants or other enterprises, an electric company cannot pull up stakes and move out of a locality if conditions are not to its liking. In that sense, an electric company is much like a farmer; each must cultivate and make the best of the land he's on. So the electric company, with its lines extended into every phase of the community life, is well advised in its endeavors to promote the prosperity of the community's agriculture, industry, and commerce, and generally to be an active good citizen. Tangible financial benefits follow, as does customer and public good will, an intangible whose presence or lack often produces very tangible effects.

To the farmer with an electrified farmstead, there is another characteristic of electric company operation which is perhaps more important to him than to any other electric customer, and that is the company's spirit of service. There are times when, despite the best in transmission and distribution facilities, conditions of flood, storm, or other emergency make service difficult and the position of the farmer and his livelihood precarious. It is at times like these that electric company people are often called upon to show as much bravery, conscientiousness, and ability to endure physical hardship as any pioneer. As you know, remembrance of real help in time of trouble is an abiding trait of human nature, and no organization devoted to providing a public need can afford to be indifferent to this fact. Both for the benfit of the customer and the company, the spirit of service must burn its brightest when conditions seem at their blackest.

In farm electrification, as in every phase of human endeavor where electricity can play a part, there is no limit to the potentialities of energy in its most flexible and usable form. We of the electric companies, as the suppliers of this essential energy, have the responsibility not only of seeing that electric service is of the best, but that no opportunity of using it to the benefit of mankind is overlooked. We have long rightfully held this role of leadership, and we must continue to do so, in farm electrification as well as in industrial or domestic use.

As we know only too well, there are those who accuse us of not living up to our responsibilities. It is very easy for us to see why they do it—they wish to take over our industry for their own selfish and ideological reasons. But the people whom we serve are naturally not in a position to see these maneuvers as clearly as we do. We must not let the American people be deceived. We must continue our fine record of progress and let them know by word and deed what it is they stand to lose if the advocates of government power succeed.

A Satisfied Customer

What electricity can mean to the farmer is pointed up in a very moving way in a letter which recently came to my attention. This letter is from a farmer in Texas, who is almost totally blind. He heard a broadcast made by my predecessor, George Gadsby, earlier this year and wanted a copy of it in Braille. Here, in part, is what this Texan, incidentally a co-op member, had to say:

In the not too distant past we got electricity . . . it came right into our living quarters and produced changes there. After we got electricity, I could exchange my spring-driven talking book machine for an electric model . . . electricity also made it possible for me to use an electric radio. . . . That put an end to having to buy a new radio battery almost every six months. Now I have a light in my room, which I did not have before. Sometimes this light has been useful even to me. Then, too, we were able to buy a small refrigerator. So now we can have really cold water in summer and better butter, or margarine, than before. We also have an electric fan which is quite handy in summer.

He said that this is as far as they have been able to go but that he is aware of other possibilities. He pointed out that if he could get an electric range for cooking, "the amount of wood sawing necessary would really diminish," and "if we can ever get enough money, we will probably put an electric pump on

(*Continued on page* 440)

Do We Need to Step Up Our Selling Efforts Now?

Murray F. Gill
President, Kansas Gas and Electric Company

An address before the President's Conference, Edison Electric Institute, New York, N. Y., September 9, 1952

THERE apparently is a question in the minds of some electric company executives as to whether or not a company should have an active, comprehensive sales program at this time. This is a subject regarding which some executives have had a fixed opinion for some years, yet there are a number of electric companies which still do not have definite thinking on the subject. There are others which feel that their load is growing as fast as they can raise money and install the facilities required to serve it, so why sell? There is a difference of opinion, not only as to whether they should have an active sales program, but also as to the kind of program they should have.

Handling System Loads

I am sure that most companies are concerned about their ability to handle system loads in the next two or three years. This concern stems almost entirely from the disruption resulting from the recent steel strike and fears that similar strikes in other industries in the future may further disrupt production schedules. As a bit of background information for the views I am about to present, I may say that our company operates in an area where the load and capacity situation has been about as tight as it has been in almost any other section of the country. We have experienced a very large growth, and this growth is still continuing at a faster rate than that of a year ago.

Perhaps all electric companies have wished at one time or another that their load would not grow so fast, and it seemed that the easy way would be to take what steps they could to slow it down. It may have seemed illogical and inadvisable under such conditions to encourage and promote load growth. But was it? Let's take a look at that question.

I suspect that most companies have outstanding commitments for substantial sums of money for system capacity to go into service in the next three or four years. Can they be certain what business conditions will be three years hence? Will the anticipated load growth actually develop? If they cannot give a positive, affirmative answer to these questions, they may badly need more sales at that time.

If this situation does develop, can these companies put together overnight a hard-hitting, effective sales organization? Even if we assume they can employ all the manpower they want and that this manpower has the requisite qualifications, and both of these assumptions are extremely doubtful, they still won't have an effective sales organization.

A group of qualified men does not make a sales department that will produce satisfactory results. Teamwork, enthusiasm, and spirit have to be built up, and that takes time. Selling is like a snowball; the longer and harder one pushes the ball, the bigger it becomes. Furthermore, sales effort, like a snowball that has rolled to a stop and started to melt under the onslaughts of active competition, is harder to restart than it was to start in the first place. A sales effort cannot be turned off and on like a spigot. The sales pressure doesn't stay constant when the sales spigot is turned off—it lessens as time passes so that when the sales spigot is opened, there is only a trickle of sales results.

Even after the sales organization has been set up and is functioning, there is a certain time element required to translate this sales effort into action on the part of the customer and, more important, into revenue for the company. Financing, the construction, alteration or enlarging of the store or factory, or seasonal factors may be involved and may have to be worked out before the company begins to receive revenue from the sales effort. All of these factors emphasize the advisability of having a sales organization that is already rolling when it is needed.

It is axiomatic that the growth and development of the industry will go step in step with, and will be gauged by, our sales efforts. It is not enough that we meet the needs of our customers. We must anticipate those needs even before the customer realizes that they exist and must educate him to recognize his needs. Sales is education—our customers deserve education on the best use of our service. We can't afford to let lack of imagination and daring spirit set the stage for someone else to take over our business.

Not only must we think of our customers but also of the welfare of the people in our organizations who are gambling their own and their families' future on our success. Furthermore, we must consider the large number of investors whom we are asking to put vast sums of money into our business. We have a very real obligation to them to insure the safety of their investment and the regularity of the return which they receive on that investment. The only way we can meet these obligations is to fulfill all of the needs, both recognized and unrecognized, of our customers for electric service. An active sales program will do much to fulfill these obligations.

The Salesman's Job

Its sales program is not a matter of concern to the company alone—it affects the lives and fortunes of many other people. Let's see how it fits in. Properly informed customers do things better, cheaper, and faster industrially, on farms, and in stores and homes. Salesmen give this information. We must do what we can to prevent unemployment by keeping workers on the job at the plants of manufacturers of appliances, apparatus, or any other current-consuming devices. Salesmen selling output can do this. We must create new industries to employ the increasing labor supply. Salesmen can help do this pioneering and creation. Our civilian economy must fill the breach when and if the defense economy declines. Only well-trained salesmen selling the goods can do this. Our industry needs friends. Liberal users of our service are our best friends. Properly directed sales activities create effective, liberal use

through customer service, selling, and education—a job for the salesman.

The purchase or decision a customer makes today determines how much revenue a company will receive from that customer for perhaps the next ten years. If a housewife buys a gas range today, the revenue from an electric range is gone for some years to come. If a merchant remodels a store or builds a new store that is not adequately wired or equipped with proper lighting and appliances, it is going to be next to impossible to sell him these items for some years to come. If an industrial customer puts in a gas furnace or even a waste heat plant to generate his own power, he will probably operate it, at least until it is written off. And these customers are not going to delay their plans until we decide we are ready to take the load.

In our territory, competitors are not pulling their punches because our load situation is tight. They have plenty of their product to sell and they are on their toes every minute of the day selling it. I am glad this is so—I wouldn't change it if I could. It keeps our company on its toes.

Selective Selling

I believe we must keep selling aggressively at all times if we are to maintain the over-all load characteristics which we need. When we let business gravitate to us, we have no control over the quality of that load. A lot of gravity business is either seasonal, has a low load factor, or has some other undesirable feature. In all probability we will have to take this gravity business whether we want it or not, but by selective selling we can produce business which has desirable characteristics and which will offset the undesirable effects of the gravity business.

Finally, I sincerely believe that electric service is one of the greatest boons to mankind. It eases the labor and increases the productivity of the factory worker, it lets the housewife retain her beauty and gives her time for social and cultural pursuits, it improves business for the merchant and the manufacturer, it takes much of the drudgery out of farm work, it improves health, and it prolongs life. There is no phase of modern life that is not enriched by electricity.

We in the electric business have the high privilege of bringing such blessings to our fellow men, but that privilege carries with it a corresponding obligation not only to make this service available to everyone at all times but also to show people how they can benefit from its use. Our sales organization is the agency to which we delegate this important responsibility. It is our duty to keep this agency functioning at maximum effectiveness at all times. If we fail in discharging that duty, then we forfeit our right to the positions we occupy, and someone else will pick up the challenge which we failed to meet.

These are the principal reasons why we think we should be selling aggressively now. Briefly, here are some of the things which can be done to carry out that program.

First, develop a sales policy, or perhaps more properly stated, a sales philosophy. It should be flexible but general and broad enough to be used for a long time. We call ours a "customer service" philosophy. Briefly stated, it is "If it's good for the customer, it's good for the company," or conversely, "If it isn't good for the customer, it isn't good for the company."

We should offer and give the salesmen wholehearted top-management support. We must firmly believe in the importance of immediate and sustained sales effort. Morale makes or breaks a sales department and morale is high or low as management supports or removes support from the sales department. Other employees will support or fail to support the sales department following management's lead. For best results, sales should be supported, guided, and challenged by top management.

In setting up an effective sales operation, it is advisable to write a sales department job specification. Decide just what selling should do for the company. Set the course. Fix the emphasis of sales effort, d e c i d e whether to merchandise or not, establish the sales budget, and determine all other matters of general policy.

Then create a challenge. Good salesmen like it. We challenge the sales department to push the production, transmission, and distribution people, and we challenge the operating department to keep ahead of sales. Of course, management is in the middle, supporting both. We like it that way because that is our job. We fulfill our responsibility by keeping ahead of both.

In our company we believe that it is better not to sell merchandise direct to the customer but actively to promote the use of electric service through close cooperation with dealers, builders, contractors, and plumbers.

We do not try to reach the individual customer, but our sales plans are based on the mass approach. The cost and the time of contacting individual customers, as a rule, is not justified by the results and, hence, our plans are generally for groups. As far as practicable, we promote the type and kind of load we want. Selective campaigns for higher load factor and greater net return are used.

Here are a few brief comments about some representative activities. In the residential field, we have dealer sales representatives in every division who contact dealers and advise them and help them in their sales programs. They work very closely with builders in their plans for wiring, lighting, etc., and build up the cooperation of the plumbing contractors.

Assistance to Dealers

We give real concrete assistance to dealers. For instance, we provide a salesman's training program to teach the dealer's inexperienced men how to sell. Also, our home service representatives, through mass demonstrations in schools, stores, clubs, anywhere we can get an audience, advise groups on home lighting, cooking, use of home freezers, etc. We prepare promotional campaigns participated in by dealers throughout the area for home lighting, ranges, home freezers, comfort cooling, and such items. We foster coordinated advertising campaigns with the dealers and assist them in their sales efforts.

In 1947 we extended electric service to everyone in the rural territory which we served who would take service. As a result, our rural area is now 100 per cent served. The division of territory between our company and the rural electric cooperatives is made under the sanction of the State Corporation Commission, so there is no conflict over territory. We endeavor to work as closely as we can with the rural electric cooperatives and have striven with considerable success to cultivate their good will.

Our rural salesmen in each division actively engage in such planned programs as better farm wiring and lighting, water system promotion, heat lamp activities, and the active promo-

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Case History of a Vacationland

E. M. Huben

Regional Promotion Director, Central Hudson Gas & Electric Corporation

An address before the EEI Area Development Institute, Yale University, September 10, 1952

ULSTER-GREENE Counties vacationland is the Catskill-Shawangunk Mountain region of the state of New York, located on the west side of the Hudson River southwest of Albany. It has an area of 1800 square miles and a population of 115,000 people, who live in 35 towns, ten incorporated villages, and the city of Kingston.

Seventy-five years ago this area was one of the most popular resort regions in the United States. It was known internationally as the romantic land of Rip Van Winkle and, as such, was publicized in every newspaper and magazine in the country. It was the summer White House during two administrations and was visited by celebrities from home and abroad—by presidents, ambassadors, barons of industry, and thousands upon thousands of people who went there for the beauty of its scenery, its healthful atmosphere, and rest and relaxation.

To accommodate these vast multitudes, hundreds of hotels, tourist homes, and boarding houses were constructed throughout the region, dozens of stores and business places were erected, highways were built over the mountains, and even new communities came into existence.

Advertising was carried on principally by the railroads and boat lines operating along the river, and when they started to publicize more distant places because of increased revenue to them, the other interests in the area failed to take up the slack. Here they were with prosperity which they thought was endless, with business that was over-flowing without effort on their part, and so they rode on their reputation and after a while, publicity wise, emulated the example of the loveable old Rip and dropped off into a sweet repose. As a consequence, the area slowly slipped from popularity, and for two or three generations business that logically belonged there was riding past its doors to other areas more alert to their opportunities.

In 1934 a significant event took place in the town of Rosendale in Ulster County. There a group of businessmen organized themselves into an association to try to publicize their community and bring back some of the prosperity of the past. Central Hudson Gas & Electric became a part of this program, and within the next five years Rosendale was successfully re-established as an all-year resort area.

In 1940, when war plants were springing up all over the country, Central Hudson made a survey of its franchise territory to determine the requirements necessary for potential war plants in its region. As far as the Catskill Mountains were concerned, it was determined that they were unsuited for manufacturing and industry, but the survey disclosed something that no one seemed to know. Even at that time there were 1900 hotels, boarding houses, tourist homes and camps that had an overnight capacity for accommodating 78,000 people at a time.

They were operating on about a 50 per cent capacity in spite of the fact that our mountains were just as beautiful and healthful as they ever were; that the area was far more accessible than most mountain regions; and that it had accommodations to fit every purse, ranging from exclusive hotels to a place to pitch a tent, with every facility for sports and recreation for the four seasons of the year. The only thing that it lacked was an appreciation on the part of the people of the value of a travel dollar and the willingness and enthusiasm to promote and attract business.

Waking Up Rip Van Winkle

It has always been Central Hudson's attitude that it cannot grow unless its territory grows. Thus Harris E. Dexter, Vice President in Charge of Commercial Relations, conceived the idea of trying to apply the successful Rosendale promotion on a regional basis. He figured that if the company could arouse the interest and enthusiasm of the people of the territory and get them to work together, the Land of Rip Van Winkle could be re-established in the travel markets of the world and could bring back the business so essential to the area's economic life.

So, first of all, the company contacted the editors of the metropolitan newspapers, officials of transportation companies serving the area, and the officers of travel organizations to determine possibilities. It was found that they were very eager to help promote any desirable region, and they offered their fullest cooperation in any program developed for the re-establishment of the Catskills. Meetings were then called in the various towns of the two counties—meetings of resort people, businessmen, public officials, and others to discuss the company's proposed plans. These groups were told very frankly in the beginning that Central Hudson's interest did not involve philanthropy or benevolence—it was strictly business—that the company was out to increase revenue from its lines and felt that if all forces coordinated their efforts, everyone would profit and the region would be bound to grow and develop.

The program started off slowly, but at the end of ten years we are proud to announce that we now have 32 community organizations working together in this program and that at their own expense each year they publish 28 individual town and community folders or directories, in which are listed the facilities of the town, the resorts, their rates and accommodations, and the individual offerings of each. These organizations also carry on newspaper advertising, and they are working together to put their own towns back on the map as a part of the regional promotional program.

The Board of Supervisors in both Ulster and Greene Counties takes part in the program. Each has a publicity committee composed of supervisors, and each annually appropriates money to supplement the efforts of the town organizations and the individual resort operators. These appropriations are spent for newspaper advertising campaigns and for the issuance of folders.

Regardless of the number of people on the public payroll, public officials never have anyone to do extra work;

so the question that was raised by the supervisors in the beginning was that they lacked someone to do the work involved in this promotion. The company then agreed that if they would keep politics and favoritism out of it, we would do the same for them that we were doing for the towns—set up their advertising layouts, maintain the contacts with newspapers, design and compose their folders, and, in addition, if they would supply us with the stationery, answer the county mail. We also agreed that we would represent them and the communities in state, regional and national organizations.

We realized right at the very beginning that we could not successfully carry on this program alone and that we must associate and affiliate with travel organizations and travel groups for a broader scope of contact and a wider sphere of operation. Included among the large organizations which have been so helpful in our program are the New York State Department of Commerce, New York State Travel Council, New York State Winter Sports Council, and National Association of Travel Officials. It was through the advice, counsel, and cooperation of these groups that we have been able to get our message across not only to every state in the Union and to Canada, Central, and South America but also to Europe and Australasia.

Accomplishments

Now, what has been accomplished? In the past ten years slightly over 2,000,000 folders have been printed and distributed through the answering of 165,000 direct-mail inquiries and through 300 agencies, such as travel bureaus, transportation companies, information centers, personnel sections of large corporations, and Chambers of Commerce located in 20 states and Canada. They have been distributed through travel shows from Boston to Milwaukee; through conventions, both local and in eastern cities; and through local agencies. With regard to direct mail, 52,000 inquiries received at the court houses in either Kingston or Catskill have been answered by two girls in our Kingston and Catskill offices on a part-time basis. In addition, the company has processed the inquiry cards received from the Department of Commerce, which have been answered through a direct-mail service, at the expense of the County Boards of Supervisors, and through local town organizations. When mail is handled this way, the inquirer receives a county folder, folders of individual towns, and folders and pamphlets of respective resort places.

In order to give some idea of the ramifications of the travel business, let me describe some of the types of letters we receive locally. Of course, a great number of them are from vacationists. However, many others are received from people desiring to purchase a camp, home or a farm—and this is particularly true every time there is a bomb scare around the city of New York. These letters are all referred to the County Realty Board and have resulted in a great number of sales, new customers for us, and new taxpayers for the communities. From inquiries which we have received and because of existence of the local organizations, two small factories have also been established.

We receive a great number of letters from people seeking jobs, principally from high school and college students desiring positions in a hotel or resort. We have letters from name bands without the name, fortune tellers, crystal-ball gazers, etc. These are very efficiently handled by the State Employment Bureau. We had one letter from a G.I. planning his honeymoon and desiring accommodations on a farm so he could prove to his bride he could milk a cow. They were located and incidentally made enough money picking apples that they were able to pay for their honeymoon and have been back several times since to the same place with the same successful results.

We even received a letter from the Gold Coast of Africa from a monkey hunter desiring to adopt us as blood brothers. If we would send him gifts, he promised to send us monkey skins, ostrich feathers, and even a gold emblem to pin on the front of our hat.

No promotional program is complete with just advertising, so each year we carry on Clean-up—Dress-up—Modernization Campaigns. In connection with these, we published and distributed a booklet, *Vacation Ventures*, a year ago that characterized the importance of clean communities, modern resorts, up-to-date facilities, good food, proper recreational activities, and social programs. We feel that this publication has had a decided effect on the attitude of a great number of our operators, and this year, for the first time, we inaugurated a bus trip to our most modern and most successful resorts. On this trip we took the officers of some of our local organizations, operators of resorts, and some public officials. This gave them opportunity to see up-to-date resort places, talk with the owners and operators, and learn the story of successful operation. We then took them home and gave them the opportunity of thinking it over.

We have conducted travel schools in conjunction with local education departments and held forums and discussions on better services, true hospitality, organized sports, and social activities the year around. Each year we also have an annual dinner meeting to which are invited newspaper editors, radio people, officers of various local organizations, and public officials. At these meetings, we have a report of the year's activity, a discussion of the program for the following year, and usually an outstanding speaker on resort promotion.

Business Upsurge

Has this program paid off? We say it has. From the beginning of the program the resort business in the area has increased, reaching its peak in 1945 when over 500,000 people had their vacations in Ulster and Greene Counties and spent $28,500,000. This record was repeated again in 1946, but, because of the world-wide competition for the travel dollar, our business then tapered off slightly until 1952, which is proving to be a very successful travel year for us.

Who pays for all of this? It is paid for by the resort people, businessmen, town organizations, towns and villages, and Boards of Supervisors. Collectively they spend from $60,000 to $65,000 a year in this promotion. There is no cash contribution made by Central Hudson to the program. We supply professional and advisory service, do the coordinating work, and furnish the clerical help for answering the county mail.

All of this has been accomplished by public officials, resort operators, businessmen, commercial organizations, newspaper and radio people, real estate boards, service clubs, women's organizations, granges, sportsmen's organizations, firemen's groups, and many individuals working together as neighbors to put their

home town back on the map and to put money in the pockets of the butcher, baker, grocer, farmer, dentist, lawyer, doctor and other business or professional people catering to human needs. It has been accomplished because there is a new spirit in the Land of Rip Van Winkle—the sleep is all over. It has been accomplished because our people realize that travel business is everybody's business, that it is the largest industry in the area, and that it is the life blood of the community.

Today we have 2000 resort places in Ulster and Greene Counties with accommodations for 80,000 people at a time. That is 20 per cent of the resorts in the state of New York. It represents more accommodations than they have in all of Switzerland. It has a potential of $40,000,000 a year, and we are out after it. There is an old saying that "God helps those who help themselves," and we have a couple instances to prove it. Because of our intensive regional organization, we were instrumental in having an amendment passed to the Constitution of New York State allowing for the construction of the Belleayre Mountain Ski Development in the Catskills, Ulster County. So far New York State has spent $360,000 in the construction of this winter sports center, at which is located the only chair lift in the state of New York, a lift that carries skiers to the mountain top in the winter and during the rest of the year tourists and travelers so that they can view the marvelous panoramas of the Catskills. This year, so far, 55,000 passengers have paid to ride on it.

Because of our existing organizations, Kingston was able to promote its 300th anniversary this year. This brought international coverage by newspapers, magazines, radio, television, and movies and was topped by the visit of Queen Juliana of Holland, national celebrities, and foreign diplomats. A British cruiser even came to our area to pay honor to the city. The President of the United States, other national figures, and the governor of every state in the Union also sent messages and birthday greetings to the first community in our region.

Why is Central Hudson in a program of this kind? For two reasons: increased sales and better public relations. People in area development work realize that it is very hard to determine the dollar and cents value of this type of promotion, but if we were to use the estimated figure used by Walter Dolbeare or Jerry Hayden and apply its percentage to our region, it would represent $250,000 revenue to us per year. We do not know whether or not this figure is applicable, but we do know that at the beginning of the program we had lines in our area that were not even earning their carrying charges and today they are back on the right side of the ledger. We also know that we have a constantly enlarging service area. Every expanding hotel, every modernized resort, every new motel, cottage, camp, and summer home is either a new or larger customer for us and a new or larger taxpayer to help carry the load.

Selling travel is a very gratifying public relations job, because when you sell travel, you are selling pleasure and happiness to people, whether they are looking for a place for a weekend, a vacation, or a home in the country. This makes one of the finest and most unusual public relation jobs to be found anywhere, for it starts right in the grass roots with existing and new customers. From here relations can be established with local organizations, editors, radio people, businessmen of all kinds, with local, county and state officials, and, on a state-wide basis, relationships can be developed that can hardly be obtained any other way.

In the past ten years, for example, we have had intimate and close relationship with the governor of the state; Executive Department; Department of Commerce; Department of Public Works; Thruway Authority; Conservation Department; Departments of State, Labor, Agriculture, Taxation and Finance; Attorney General; and Department of Correction. Promotion of the 300th anniversary of Kingston also broadened out our contacts with the State Department at Washington; FBI; War Department; French, Dutch, and English Counsels; and even with the Queen of the Netherlands.

So, the whole story of Ulster-Greene Counties vacationland is a story of successful cooperation, and sometimes we think it is too bad that old Rip can't come back and see it all. But, then again, maybe he is better off where he is, because if he were to try to take a snooze on the mountain top today, some skier, mountain climber, hunter, or other variety of happy vacationist would be bound to disturb his slumber.

Do We Need to Step Up Our Selling Efforts Now?

(*Continued from page* 422)

tion of electric ranges to offset LP gas competition.

Our commercial representatives work very closely with architects, contractors, and building managers in planning new buildings and remodeling old ones. In addition, they work directly with individual customers on such planned programs as wiring for the future, planned lighting for greater profits, commercial cooking, and commercial refrigeration.

To tell what we are doing in the industrial phase of our sales work would require considerable space. Briefly, we act as consultants for industries on methods, electrical applications, lighting, etc. We call on each of the larger industries at least once every 30 days. Over the years we have built up a reputation for impartially and competently assisting and advising our industrial customers, following our "customer service" philosophy, and have gained their confidence.

In addition to general industrial consultants and sales engineers, we have specialists in petroleum production, drilling, pumping, etc., pipe line pumping, oil refining, processing of agricultural products, coal mining, meat packing, and airplane manufacturing.

I am not trying to sell our program. Undoubtedly many companies have in operation a better program than ours. I have tried to present our thinking on why we should have an aggressive, selective sales program. Even though a company may not need the business now, it may need sales in the next few years. Executives should be actively interested in sales work. The logical approach for most sales activities is through the mass approach. Sales should be a continuous program, not turned off and on, and sales and more sales will help cure some of the industry's problems.

Area Development Institute Conducted at Yale University

Response to Meeting Spurs Plans for Similar Institute in Michigan Next Year

DESIGNED as a short course in basic area development principles which have stood the test of actual practice, the Area Development Institute, held at Yale University, September 9-11, brought together more than 80 representatives of electric companies throughout the nation to exchange ideas on area problems and hear the authoritative presentations of speakers eminent in their respective fields.

Though it dealt specifically with area development in New England and the Mid-Atlantic States, the institute was sufficiently general in nature that methods applicable to situations in other parts of the country were covered. Response to the three-day meeting, under the chairmanship of Paul V. Hayden, Director of Public Relations of The Connecticut Light & Power Co., and sponsored by the EEI Area Development Committee, was such that a similar institute, to be held in Michigan, is being planned for next year.

Positive Action Recommended

Following a welcome from J. Frank Gaskill, Sales Manager of the Philadelphia Electric Co. and Chairman of the Area Development Committee, Sherman R. Knapp, President of The Connecticut Light & Power Co., opened the meeting with a talk on "The Electric Companies' Larger Responsibility." Mr. Knapp said that the social and economic planners of the Federal government had been encouraged by individual citizens who accepted the privileges of freedom without exercising its responsibilities. It is the failure of local interests to cooperate fully in the development of community resources, he stated, that has led to government intervention. Area development is of particular interest to electric companies, he pointed out, not only because prosperous communities mean more and better business but because helping people to help themselves is an effective means of combatting socialism.

Speaking on "The Necessity for Area Development," Dr. C. S. Wyand, Assistant to the President of Pennsylvania State College, stated that area development is "simply a grass roots application of self-reliance in appraising and developing local resources. . . . It seeks simply to create an environment in which local resources can be used to maximum local advantage." Mr. Wyand went on to summarize the procedures involved, as follows:

1. An area development program would do everything possible to improve the competitive position of existing local industries and enterprises. This might involve municipal improvements essential to industrial needs; cooperating with industries in ironing out technological, management, or sales problems; or lead to establishment of special educational programs to upgrade labor. In short, such a program would help to do whatever is needed to keep existing local industry prosperous.

2. An area development program would energetically promote the establishment of such new industries as would enhance the effective use of local resources, both human and physical. It would involve efforts to keep out fly-by-night industries and such legitimate enterprises that had small chance of local survival. It would set as its goal the effective long-range private employment of every economic asset an area possesses.

3. An area development program would recognize the advantage of economic diversification and would strive to create a healthy balance among industrial, agricultural, and commercial activities throughout a region. No one man, no one company, can accomplish this, but area cooperation can.

4. Finally, an area development program would safeguard the future by establishing a plan for conservation and development of local resources. This would involve any activity necessary to keep an area from becoming blighted through shortsighted use of its factors of production.

Of all local groups, Mr. Wyand said, the electric company is the surest source of effective guidance in area development, for three reasons:

1. An electric company has an area-wide perspective. Local merchants frequently confine their efforts to their limited trading area, despite the fact that solutions to problems often lie further afield and require inter-community cooperation.

2. An electric company has an organization of sufficient size, permanence, and diversification to provide continuity of plan and purpose.

3. By nature, an electric company not only has access to the information and data necessary to many types of area development but deals constantly with the people at regional, state, and national levels whose help is essential to such development.

Justification for Outlays

Mr. Wyand went on to say that outlays for area development can be justified to stockholders because (1) area advancement is the source of electric company bread and butter; (2) it is the best possible form of public relations; (3) implicit in a franchise is the electric company's obligation to work in the consumer's behalf, as if in direct competition with another company; and (4) if electric companies do not engage in area development, the government will.

The remaining four sessions were devoted to specific considerations, including civic development, recreation and tourism, conservation and agriculture, and industrial development. Concluding the institute was a summation presented by Chairman Gaskill.

A Study of Annual Reports to Stockholders for 1951

E. E. Roll
Executive Secretary, The Detroit Edison Company

A summarization of a project report of the joint EEI-AGA Subcommittee on Financial Reporting under co-chairmanship of Mr. Roll and F. J. Labanca, New Orleans Public Service, Inc.

IN recent years, annual reports to stockholders have received increasing attention as a medium for conveying industry's story of accomplishment to the public. What used to be a stodgy publication has now blossomed out into the slick-paper, multi-color, popular magazine class. Whatever one's own personal opinion may be of some of the more extreme examples of this metamorphosis, there is evidence that to a greater or less degree we are all being carried along on the tide.

We can all agree, I think, that some good has come from the increased emphasis on reporting to stockholders. Accounting people in the electric and gas utility industry have participated in the attempt to make their financial and statistical information more understandable. As an aid to this objective, the General Accounting Committee of the Edison Electric Institute and American Gas Association has for the last three years sponsored a research project involving a rather exhaustive study of current industry practices in reporting financial and statistical information to stockholders. This work has been carried out by Joint Subcommittees on Financial Reporting.

The subcommittees selected 56 companies representing a cross section of the electric and gas industry. Included were ten electric companies, 24 gas companies, and 22 combination companies. A larger number of gas companies was included because the combination companies were predominantly electric. Each year the annual reports to stockholders of these 56 companies are analyzed to determine the manner in which the financial and statistical data included in reports have been presented and to compare the terminology used to describe the accounts and transactions. This information is set forth in considerable detail in a published report, the latest of which, covering the year 1951, was released on October 15, 1952, and compared 1951 practice with that for the years 1950 and 1949.

These reports are intended solely for reference. From them, persons responsible for preparing annual reports can quickly determine how other companies treated a particular balance sheet account or other item of financial or statistical information. Any definite trends in reporting practices over a period of years are also readily apparent in these reports.

In this article, I should like to point out some of the more important findings revealed in the latest report. First of all, however, it should be understood that there is no intent to imply that any particular form of presentation or terminology is preferable, except to the extent that its more frequent usage may so indicate.

The Certified Balance Sheet

In studying the balance sheet, we found out some interesting things. All of the 56 utilities presented the conventional "balancing" type of balance sheet, with assets on one side and liabilities, capital, and reserves on the other. An increasing number of industrial companies are departing from this convention. Instead, they list the assets net of applicable reserves, then deduct the liabilities to show the resulting stockholders' equity. The contention is that this is more understandable to the ordinary person who is not conversant with the balancing feature of double entry bookkeeping and becomes confused at seeing capital stock and surplus listed under the heading of "liabilities."

Perhaps this new form of balance sheet is more readily understood by the layman. If so, we certainly should not dismiss it without some consideration, but I do feel that a utility is much more restricted in the length to which it can go in simplifying its statements than is a non-regulated industrial company. As long as its earnings are measured against the assets devoted to serving the customer, a utility cannot afford to jeopardize its position by reporting in a way which, even by implication, tends to reduce the basic investment.

A balance sheet gives a picture of conditions at a particular fixed date. Thus it is static and standing alone does not reveal the manner in which the pictured condition was determined. But by also showing the comparable figures at the same fixed date a year ago, the changes that are indicated give a much more informative picture. In the 1951 annual reports, 45 out of the 56 utilities studied did use comparative balance sheets. In this respect, we are far ahead of the industrial companies where, in a study of 525 companies by the American Institute of Accountants, over 40 per cent were found showing balance sheet figures for the current year only.

We found that 38 of the 56 companies gave some breakdown of the plant figure on the balance sheet, while the other 18 reported only the total plant.

The Securities and Exchange Commission now requires that financial statements reported to stockholders follow the form prescribed for SEC reports, where the reporting company is subject to the Holding Company Act. This has resulted in a sharp increase in number of companies deducting depreciation reserve from the plant account on the balance sheet. In 1951, there were 21 such cases as against ten in 1950 and three in 1949.

Receivables were reported in some detail on the balance sheet by 27 companies, which is one less than in 1950. A slight upward trend was noted in the number of companies deducting the uncollectible reserve from receivables. There were 44 companies so reporting in 1951.

With respect to inventories, a definite trend toward showing a detailed breakdown on the balance sheet was apparent. Twenty-three companies did so in 1951, as against 19 in 1950 and 15 in 1949. Furthermore, it is a growing practice to indicate the basis of pricing.

The practice of locating the capitalization section as the first item on the liability side of the balance sheet and including therein both equity and debt capital is growing. This method was followed by 39 companies in 1951, 38 in 1950, and 32 in 1949. Tne term "surplus" has fallen into disrepute, and a great many industrial corporations have discontinued using it. In its place some variation of the terms "retained earnings" or "retained income" is ordinarily found. The utilities have been much slower to adopt this change, only 13 having done so in 1951.

It was found, for some reason, that a greater proportion of companies show in their balance sheets the number of shares authorized and outstanding and the par value per share with respect to common stock than is the case with respect to preferred.

The trend among utility companies is away from reporting any breakdown of tax liability on the balance sheet. On the other hand, practically all industrial companies show the income tax liability separately.

Most utility accountants are aware of the fact that for some time the American Institute of Accountants has been advocating a limitation of use of the term "reserve" to mean a reservation of surplus. However, acceptance of the Institute's recommendations is not as yet very widespread. As a result, we find a rather indiscriminate use of the term "reserve," both on the part of utilities and industrial companies. There does seem to be a greater tendency for the industrials to eliminate the word "reserve" in speaking of amounts provided for depreciation.

The Certified Income Statement

Study of the Certified Income Statements revealed that the conventional type of income statement is favored by most utilities. One company used the "amounts received" and "amounts paid out" form with no sub-groupings under either section. All but four of the 56 utilities provided comparative income statements, usually for a two-year period. The combined income and earned surplus statement is not popular, only seven companies using the combination form.

Neither is it common practice to show the earnings per share on the income statement. Only seven companies did so in 1951.

A departmental breakdown of revenues (electric, gas, etc.) is usually shown in the income statement, but only five companies reported this detail by rate classification or type of customer. Supplemental tabulations of tnis information are ordinarily provided elsewhere, but it seems to me that setting forth the major classifications of revenue in the income statement would be extremely informative.

In analyzing revenue deductions, it was found that 19 companies reported all operating expenses as a single amount, while another 17 separated the cost of electricity or gas purchased. This left 20 companies which reported in greater detail. However, considering the fact that fuel and labor are major elements of the total cost of operations, it is somewhat surprising that so few companies set forth these items separately in the income statement. Fuel cost was shown by seven companies and labor cost by two.

Most of the companies show maintenance expense separately, but only one segregated the labor portion.

It is common practice, of course, to report the provision for Federal income taxes separately, and only six out of the 56 companies included in our study failed to do so. Quite a few also reported in some detail as to other classes of taxes.

Only three companies referred to special amortization of emergency facilities in their 1951 Annual Reports. It is recognized that for the most part property covered by necessity certificates was not yet completed and entitled to amortization. In the three cases referred to, the income tax reduction resulting from use of five-year amortization in lieu of depreciation for tax purposes found its way into earned surplus via net income. One company stated that the resulting increase in net income was regarded as being not available for current distribution to stockholders. Another said that the amount was relatively small and that the benefits, if any, would not be material. The third company quoted the estimated maximum annual reduction of income taxes which would result from the special amortization, based on present tax rates.

The Certified Surplus Statement

With respect to the certified earned surplus statement, two comments appear indicated. As already stated in connection with the balance sheet, there is no very decided trend toward discarding the term "surplus." It was also found that the practice of passing a wide variety of items through the earned surplus account is still general. Furthermore, many of these charges or credits involved relatively small amounts. Both the SEC and the public accountants have in recent years attempted to discourage this practice in favor of passing practically all items through income.

Notes to the Financial Statements

In analyzing notes to financial statements, an understandable variety was found, since many such explanations relate to special situations peculiar to the individual company. In each of the three years covered by our study, however, there were several categories of information which appeared in a considerable number of cases. Those most frequently covered were basis of valuation of plant, depreciation practice, estimate of future construction expenditures or purchase commitments with respect thereto. These are not special situations but are common to most, if not all, companies. Why then do some feel it necessary to comment and others not? The answer would seem to depend on whether the decision rests with the individual company or with outside auditors. If with the latter, one would expect to find greater uniformity.

Condensed Summary of Operations

The condensed summary of operations is a widely used statement setting forth the source of revenues and their disposition. Presumably it is intended to be a simpler and more understandable version of the formal income statement, but it was found that despite this, a majority of companies continue to use technical accounting terminology in describing the items.

Usually labor (often combined with employee benefits) and fuel are set forth separately in this type of state-

ment. This is not ordinarily done in the certified income statement. Both of these are very significant expense items and probably should be publicized, but there might be less question of the validity of the labor figure if it appeared in the statement which is certified by independent auditors.

Statistics

A vast range of statistical information appears in annual reports to stockholders. Our study broke this down into four categories, as follows:

1. *Balance Sheet Data* were the least frequently shown of any of the four categories. In 1951, we found 24 companies reporting plant investment data. Number of shares of common stock outstanding was next in frequency, with number of stockholders, depreciation reserve, long-term debt, and total capitalization following closely.
2. *Income Statement Data* shown in statistical tables included revenues by classes of service, earnings per share, gross revenues, net income, dividends, and retained income.
3. *Statistics relating to electric operations* were analyzed and the information most frequently found dealt with number of customers, kilowatthour sales, output, peak load, generating capacity, annual kilowatthour sales per residence customer, average revenue per kilowatthour for residence service, and number of employees.
4. *Statistics relating to gas operations* corresponded closely to electric operating statistics in type of information most often presented.

Miscellaneous Charts and Tabulations

Miscellaneous charts and tabulations appearing in 1951 annual reports were slightly less in number than in 1950, but there was a tendency to present more types of information and in greater detail. The subject matter which proved to be most frequently shown in chart or tabulated form included revenues, unit sales, plant and construction, customers, capacity, average consumption and rates, expenses and taxes, stockholders, employees and payrolls, and capitalization.

Altogether there were 272 charts and 151 tabulations in the 56 annual reports for 1951.

It is obvious from the above resumé that our study has revealed a substantial lack of uniformity. Personally, I do not think that this is at all undesirable. The value of this study would seem to lie in the fact that it shows in considerable detail just what a number of companies are doing. If a person sees something that appeals to him, it may be possible to adapt it to his own use. As long as all essential facts are revealed, I do not feel that uniformity is required.

New Book Chronicles P. G. and E. History

P. G. AND E. OF CALIFORNIA. By Charles M. Coleman. McGraw-Hill Book Co. 385 pages. $4.50.

THE San Francisco Gas Co. was organized in 1852. In 1952, its successor, Pacific Gas and Electric Co., received the Charles A. Coffin Award for "a distinguished contribution to the development of electric light and power. . . . "

What happened during the 100 years between these two events is told in this attractive and well-documented book, which is a pleasant contrast to the usual company history.

Although it was prepared to tell the centennial story of Pacific Gas and Electric, the book—and the company's history—really begins with the Gold Rush of '49, the miners' demand for water power to save time and labor, and the water companies that built aqueduct systems to meet their needs—systems that, rebuilt and improved, are still in use in many areas for irrigation and power.

The author emphasizes the contribution of individuals and the influence of personalities upon events in the story of P. G. and E., a happy choice that makes for much more interesting reading than would a detailed chronology of the hundreds of companies that are now part of the present company.

Peter Donahue, who came to California for gold and visualized the potential rewards in supplying gas to San Francisco . . . Prince Andre Poniatowski, who traveled from France to break an engagement he had not contracted and remained to build a hydroelectric plant that operated for nearly 50 years . . . Claus Spreckels, sugar magnate, who turned the smoke from a power plant that smudged the walls of his office into a profit of $1,214,000 . . . these and scores of other leaders who took part in building the company are brought to life in these pages.

Readers in almost every phase of utility operations will find interesting material in *P. G. and E. of California.* The engineering vision that harnessed the water power of the Sierra and Cascades and brought electric power over then unheard-of distances . . . the vast task of merging and consolidating some 520 utilities into the present company . . . the financial crisis that followed the San Francisco earthquake and fire of 1906, and the skilled leadership that brought the company safely through this period . . . the problems posed by the company's epic post-World War II expansion, its relations with the Bureau of Reclamation, and many other fields of utility operation in which P. G. and E. has excelled are recorded in detailed yet interesting style.—J. H. R.

Frank E. Watts

FRANK E. WATTS, recently retired Executive Assistant directing the Rural Electric Information Exchange, Farm Journal, Inc., died October 28 at Dunedin, Fla. He was 74 years old.

Widely known throughout the electric industry for nearly 50 years, Mr. Watts was in later years identified with rural electrification promotion and in 1950 an EEI Prize Award, known as the Frank E. Watts Award, was established by Farm Journal "to promote and sell the use of electrically operated farm equipment as a means of improving agricultural productive efficiency."

Mr. Watts was born in Sunbury, Ohio, and entered the electric industry in 1905 as a machinery salesman. He subsequently sold incandescent lamps for Western Electric Co. and in 1913 joined the sales staff of *Electrical World.*

In addition to serving as editor of *Electrical Record* and *Electrical Dealer,* Mr. Watts was also one of the founders of Bennett-Watts-Haywood Co., former publishers of *Electric Light & Power.*

Forty-fifth Annual Meeting of PEA Convenes in Pittsburgh

J. M. Huebner to Head Association During the Coming Year

WITH approximately 675 delegates from Pennsylvania's 28 business-managed electric companies in attendance, the 45th annual meeting of the Pennsylvania Electric Association was held recently at the William Penn Hotel, Pittsburgh, Pa.

J. M. Huebner, Pennsylvania Power & Light Co., was elected president of the association for 1952-1953, succeeding R. A. Gallagher, Pennsylvania Electric Co., and John M. Orr, Duquesne Light Co., T. O. McQuiston, Metropolitan Edison Co., and E. O. Flora, Pennsylvania Power Co., were named vice presidents.

Following a welcome to Pittsburgh from Pressley H. McCance, President of the Duquesne Light Co., delegates were addressed by Pennsylvania's Gov. John S. Fine, who predicted continuation of the state's rapid industrial growth and pointed out that rural electrification in Pennsylvania had increased 40 per cent since the end of World War II. Gov. Fine emphasized also that Pennsylvania ranks low in public ownership of electric power, less than one per cent being so owned and this largely in the field of municipal lighting.

The Hon. Harold A. Scragg, Chairman of the Pennsylvania Public Utility Commission, warned against the insidious methods now employed by certain government factions to feed socialism to the American people in "gradual, sugar-coated doses" and advocated the use of public relations campaigns to combat Federal encroachment.

B. L. England, Institute President and President of the Atlantic City Electric Co., expressed optimism with regard to socialistic trends and stated that the past accomplishments and future plans of the electric industry are an effective challenge to government ownership. He pointed out that only a healthy private business could act as tax collector for the government to the extent that the electric industry has, having paid—out of $4,965,000,000 of revenue received in 1951—$610,000,000 in Federal income taxes, in addition to $1,150,000,000 in other taxes to local, state, and Federal agencies.

W. J. Ridout, Jr., Editor of *Electricity on the Farm,* called attention to the untouched potential in rural consumption of electricity. Not including manual labor or animal power, there is about 30 hp per worker available to the farmer, of which 6 hp can be supplied by electricity, Mr. Ridout said. Of this 6 hp, he continued, less than 1 hp is now being furnished by electricity.

In an address on tax trends and effects, James J. Mahon, Jr., tax expert and member of the firm of Lybrand, Ross Brothers and Montgomery of Philadelphia, declared that we won't know when we have reached the tax saturation point until too late. Mr. Mahon stated that high taxes often spawn wastefulness and lead to unsound spending and cost habits that are hard to correct in future years. This, he said, is not the most favorable time to train junior executives.

Other speakers at the two-day meeting included Henry J. Taylor, news analyst and radio commentator, and Miss Vivien Kellems, head of the Kellems Co. and recent candidate for the U. S. Senate.

Newly elected PEA President J. M. Huebner (center), Pennsylvania Power & Light Co., receives congratulations from retiring President R. A. Gallagher, Pennsylvania Electric Co. PEA vice presidents for 1952-53 named at the annual association meeting are (left) John M. Orr, Duquesne Light Co.; (second from right) T. O. McQuiston, Metropolitan Edison Co.; and (right) O. E. Flora, Pennsylvania Power Co.

Safety Awards

Award winners in PEA's annual safety contest were presented plaques and certificates of merit at the opening session of the conference. Top honors in Group 1, consisting of companies averaging 2,500,000 or more man-hours annually, went to Metropolitan Edison Co. for a low frequency rate of 2.73. Pennsylvania Power & Light Co. placed second and Pennsylvania Electric Co. third.

Among companies in Group 2, those averaging 350,000 to 2,499,999 man-hours yearly, Pennsylvania Power Co. led, with Northern Pennsylvania Power Co. placing second and Pennsylvania Water & Power Co. third.

Winners in Group 3, consisting of companies with an average of from 1,000 to 349,999 man-hours annually, were Natrona Light & Power Co., first; Home Electric Power Co., second; and South Penn Power Co., third.

Power Regained by Cleaning Santeetlah Tunnels

B. J. Fletcher
Aluminum Company of America

A paper presented before a meeting of the EEI Hydraulic Power Committee

SOON after the Santeetlah hydroelectric development was placed in service in June, 1928, a dark, greasy deposit began to form on the inside of the five-mile conduit. The fouling increased in thickness and roughness over the years, and periodic checks of full load head loss in the conduit showed a gradual increase from 40.2 ft in 1928 to 62.8 ft in 1951. Based on typical operation and average value of power, the loss rose to about $20,000 per year.

In the summer of 1951, the tunnels were cleaned by washing, with the result that the head loss dropped to 42.2 ft and has not increased in the past eight months. The cost of washing was about $20,000, so the operation proved very profitable. The following description of the investigation of the fouling and of the method of cleaning may be helpful to others faced with a similar problem.

Surrounding Countryside

The Santeetlah development of the Carolina Aluminum Co. lies in the beautiful mountain country of western North Carolina. The 200-ft high concrete arch dam on the Cheoah River forms a lake, which has an area of 2863 acres when filled to its normal elevation of 1939.6 ft. The lake shore is very irregular, with long arms extending up the narrow valleys between high hills. The drainage area is heavily wooded with second growth hardwoods, pine, hemlock, and laurel. There are a few small farms along the lower reaches of the streams and in the mountain hollows. Normally the branches run clear and cool, but when typical heavy rains break over the watershed, some become cloudy with silt and organic matter.

Santeetlah power house is located five miles from the dam on Cheoah Lake, which is a section of the Little Tennessee River. The Santeetlah power house has two 30,000-hp reaction turbines, which have a water capacity of 898 cfs at 647 ft head. The power produced has averaged 145,000,000 kwh per year since the plant was first put on the line in June, 1928. This power flows into the TVA system, which in turn furnishes power for the operation of Alcoa, Tennessee works of the Aluminum Co. of America, the parent company of Carolina Aluminum Co.

From Santeetlah Dam water flows to the power house through a conduit composed of a series of five tunnels and six sections of steel pipelines. Of a total length of conduit of 26,123 ft, about two-thirds is concrete-lined tunnel and one-third is steel pipe, either in the open, as at river crossings, or underground near tunnel portals. The main portion of the steel pipe is 11 ft in diameter, and the tunnel sections are a modified horseshoe section with an area of 100 sq ft. The velocity of water through the tunnels is about 9 ft per sec at full load.

In 1939 an inspection of the tunnels and pipeline revealed that they were coated with a soft, dark, greasy deposit about ¼-in. thick. As the years passed, this deposit gradually increased in thickness to as much as ⅝-in. in some spots, with an average thickness of about ½-in. on the smooth concrete lining of the tunnel.

The surface of the deposit was ripple marked in a varying pattern like fine sand on a sea beach. The ridges were from ½- to 1-in. crest to crest and from ⅛- to ¼-in. high. Head loss tests gave a friction coefficient for the Manning formula of about .016 for the tunnels when covered by the fouling deposit. This was reduced to about .013 by cleaning down to the smooth concrete lining.

When wet, this deposit was firm and spongy but could easily be scraped off with a putty knife. The deposit tended to break loose in large flakes or slabs, and, in fact, bare patches were occasionally found on the concrete walls where slabs had loosened and fallen off.

When the conduit was drained for inspection or painting, the deposit on the inside of the steel pipe dried out rapidly and turned to a fine dust, almost like soot, which could be easily brushed off. On the concrete walls of the tunnel, drying was much slower, and the deposit stayed moist even when the conduit remained empty for several weeks.

After periods of drainage, the head loss through the conduit decreased sharply, one observation in 1949 showing a drop from 62 ft to 53 ft in head loss at full gate. Unfortunately, this improvement did not last, and the losses gradually returned to their previous high level within three to four months after the plant was put in operation.

During the early period of operation at Santeetlah, it was believed that the fouling deposit was caused by some living organism, such as algae or iron-forming bacteria.

Chemical Treatments Attempted

Over a period of years, numerous attempts were made to remove the deposit by chemical treatments. The nature and extent of such treatment was limited, on the one hand, to the cost of the application and the chemicals, and on the other hand, by the necessity of limiting the discharge of chemicals into the Little Tennessee River to prevent injury to fish. In one case, 600 lb of copper sulphate was introduced into the conduit, and in another series of experiments, 5,000, 10,000, and 15,000 lb of sodium carbonate were used. In each case, the solution was held in the conduit for several hours before being released. Another line of approach was the introduction of compressed air into the water near the intake of the conduit. None of these treatments proved effective. In each case, the head loss dropped slightly after the treatment, with the maximum gain being about 2 ft. However, within a month the loss had risen to its previous level. As a result, it was decided that chemical treatments were economically impractical.

During 1949 and 1950, a very careful and thorough investigation of the nature of the deposit was made by Professor Arthur L. Pollard, University of Tennessee, and Hazen E.

House, Jr., Alcoa Power Division. Samples of the deposit and samples of water from various points in the system were collected and analyzed. Glass microscope slides were exposed to water from the penstock, and the nature of the deposit was carefully examined. This study disclosed the unexpected fact that the deposit is not living organisms, nor is it the residue of organisms which have lived on the walls of the tunnel and pipeline.

Examination of samples disclosed that the deposit consisted of 87 per cent water and volatile organic matter, 2.5 per cent organic matrix, and 10.5 per cent mineral matter. The organic matrix proved to be decomposed plant material in the form of gelatinous masses. About 25 per cent of the mineral matter was small rock fragments composed largely of silica and alumina and presumably derived from soil which had been washed into the reservoir from roads and fields. The balance of the mineral matter was iron and manganese oxide. An analysis of water from streams flowing into the reservoir revealed that the iron and manganese content paralleled the amount of sediment in streams flowing into the reservoir.

The following is quoted from the report of Messrs. House and Pollard:

> The deposit shows clear evidence of formation in yearly layers, and it is thought that most of it accumulates during the fall when decomposing plant material is washed into the lake from the forest floor. The material is largely polysaccharide in nature, and there is evidence that much of it is from decomposing algae. In the presence of ferrous ions, these polysaccharides become mucilaginous and will adhere strongly to any surface. At this stage the deposit contains much more iron than manganese and also contains more diatom shells and rock fragments than are found in the older layers.
>
> The deposit, having become attached to the tunnel wall or to previously formed layers, gradually shrinks through bacterial oxidation and as it does so most of the diatom shells and rock fragments wash out. Iron also exchanges for manganese by some process which we have been partly able to duplicate in the laboratory.

As a result of past experience and of the determination of the nature of the deposit, it was decided that the only practical method of removing the growth was by mechanical means. Accordingly, plans were made to wash the interior of the tunnels.

During the summer of 1951, stream flow was low and the demand for power in the Tennessee Valley was high. For this reason, it was essential that the cleaning operation be completed in the least possible time and that no water be spilled while the tunnels were out of service. Flow conditions were such that the Santeetlah reservoir was drawn down so that approximately 38 ft of storage was available to catch water during the cleaning period. At the completion of the work, the reservoir level had risen only 15 ft.

Three Tunnels Cleaned

Previous experience had indicated that the most serious loss of head occurred in the concrete-lined tunnels, and, therefore, the cleaning was restricted to the three main tunnels. The total length of tunnel cleaned was 18,400 ft, of which approximately 90 per cent was concrete lined and about 10 per cent had a steel lining. The total lengths cleaned were as follows: tunnel No. 2, 3715 ft; tunnel No. 3, 5550 ft; and tunnel No. 4, 9110 ft. The total area cleaned was 659,000 sq ft or approximately 15 acres.

The only available access to the tunnels was through 18-in. manholes located near the portals of the tunnels. No sources of electric power or water under high pressure were available near these manholes. These conditions dictated the type of equipment which could be used.

For tunnel No. 2, wash water was drawn from the pipeline where it dips down to cross the Cheoah River. This reservoir was kept filled by admitting a small amount of water to the conduit through a bypass valve at the intake gate. For washing tunnels No. 3 and 4, water was obtained from Yellow Creek, a small stream passing under the pipeline near a manhole.

The main problem then was to supply water and light to any point along the tunnels. In tunnel No. 4, the distance from the access manhole to the extreme point at which washing was to be carried out was nearly two miles.

After careful consideration, it was decided to supply the water by means of a portable fire pump located outside of the pipeline near the access manholes and to deliver the water to the washing point through 3-in. Alcoa Aluminum Construction Pipe similar to that used for irrigation work.

The pump used was a centrifugal pump rated at 200 gpm for pressure of 250 psi, the pump being driven by a six-cylinder gasoline engine. This pumping unit proved most efficient and economical. It was operated at high speed for a total of about 17 days, often for 20 hours or more per day.

The aluminum pipeline was chosen because of its extremely light weight and the ease with which it could be transported and laid. This pipe is seamless tubing made from a strong aluminum alloy. It has an outside diameter of 3 in., with a wall thickness of .050 in. It was supplied in lengths of 30 ft which weighed only about 16 lb and could thus be handled very readily. Irrigation-type couplings, which consist of an aluminum sleeve containing special rubber gaskets, were used. No threading or expanding of the pipe end is required, and the thrust at the joints is taken by a simple bolted clamp. The extremely smooth interior surface of the aluminum pipe reduced head loss to a minimum. A careful test indicated that the friction coefficient for the Manning formula for this pipe is .008.

At the discharge end of the 3-in. aluminum pipe, a fitting was attached to take two 1½-in. fire hoses. These hoses were each 200 ft long, and it was possible to clean 400 ft of tunnel without changing the length of the main pipeline. Water was discharged through standard fire nozzles, and at first a nozzle having an opening ½-in. in diameter was used. This was later reduced to ⅜-in. diameter and improved results were noted.

Best efficiency was obtained with a pressure of 125 psi at the nozzles. This stream rapidly cuts the deposit from the walls, and the back pressure is about as high as the men holding the nozzles can handle for long periods of time.

Very useful accessories to the cleaning were portable flood lights, powered by a 6-v storage battery, and Army field telephones, which permitted communication between the

pump and various locations along the line. Inside the tunnel, pipe was transported on a small hand-drawn wagon, which would take 50 pieces of 30-ft pipe.

The work was carried out using three eight-hour shifts, with 10 men on a shift. The men handling the hoses stood side by side and worked out a satisfactory routine for cleaning. They took great pride in handling the nozzles, and there was keen competition among the various shifts to see who could clean the greatest length of tunnel.

The quality of the cleaning was very thorough, and almost no scraping was required to supplement the work of the hoses. As a whole, the concrete lining was very smooth and showed remarkably little deterioration after nearly 25 years of service. In many places, form lines and even original surveyors' marks painted on with red lead were visible after cleaning. The steel pipe had been well protected, first, by its original coat of red lead, and later, by a bituminous paint applied in 1946. At one time there was some concern that the fouling deposit might have an adverse effect on the concrete or the steel, but actually its effect seemed to be protective rather than destructive.

Cleaning of tunnel No. 2 started on August 7 and was completed on August 11, with the average rate of progress being 23.1 sq ft washed per min. Tunnel No. 4 was washed next at an average speed of 24.1 sq ft per min. On tunnel No. 3, the last one washed, the progress was 37.6 sq ft per min. Washing was completed on August 30.

Improved Rate of Washing

The increase in rate of washing was due to a steady improvement in organization and in operation of equipment. In each case, washing was started at the low end of the tunnel and progressed back upgrade toward the pump. Initially, a great deal of time was lost as a result of blowing out gaskets in the couplings. This was found to be caused by a few couplings which were oversize, thus permitting the soft rubber gasket to be pushed out between the coupling and the pipe. When these oversized couplings were eliminated, trouble with blowouts ceased. Because of the light weight of the pipe and the speed of the coupling, the hoses could be moved back 400 ft on the main pipeline in a few minutes.

After washing was completed, the floor was covered with 2 to 6 in. of a soupy mush composed of the fouling deposit and a small amount of sand. This was flushed out through drain holes, using a stream of water and two or three men with brooms. At intervals it was necessary to collect the muck and haul it to drain holes in the hand cart.

Direct labor costs for the operation were $12,000, and all material and equipment cost approximately $8,000, or a total of $20,000 to do the job. This amount includes the pump, pipe, and hoses, all of which are in good condition to handle any future work.

Removable Section Constructed

During the cleaning, access to the pipeline was improved by making a removable section 15 ft long in the pipeline at the Yellow Creek crossing. Heavy flanges were fabricated in sections and welded to the outside of the pipeline. After the flanges were in place, the pipe was burned in two from the inside, thus freeing the section which was rolled out of the line. When work was completed, this removable section was replaced in the line and bolted up using soft rubber gaskets between faces of the flanges. This removable section will be of considerable assistance in any future maintenance work in the conduit.

During October, 1951, a careful test was run to determine head loss in the conduit following the cleaning operation. The original tests on the new conduit in 1928 showed a total loss of 40.2 ft of head at a flow of 900 cfs. The 1951 test after cleaning showed a loss of 42.2 ft at the same flow. It is assumed that the slight increase in loss is occasioned principally by the remaining deposit in the steel pipe sections of the conduit, which were not cleaned this year.

A check on the head loss just before the cleaning showed it to be 62.8 ft for a flow of 900 cfs. Thus, the cleaning reduced head loss by 20.6 ft, which will give an increased production of power worth between $15,000 and $20,000 per year.

It is expected that the deposit will form again, and a check will be made every few months to determine the rate of increase in head loss and to decide when cleaning should be repeated. A check made in April, 1952, showed no increase in head loss since cleaning.

Professor Pollard's studies indicate that a dose of hydrated lime may cause a thin deposit to loosen and fall off the interior of the conduit. This possibility is still under study.

In conclusion it may be said that the work on the Santeetlah pipeline has demonstrated the following facts:

1. The fouling deposit is inert matter and is not a growth of organisms on the interior of the conduit.

2. Chemical treatment, within practical limits of cost and safety to fish, will not remove the deposit after it has had a year or more to build up. The desirability of periodic chemical treatments starting with a clean tunnel still remains to be answered.

3. Cleaning by washing with a small high-pressure stream proved effective, economical, and fast for the conditions prevailing in the Santeetlah conduit.

Donald Gunn

DONALD GUNN, Vice President of Pennsylvania Water & Power Co. and Assistant Advisory Engineer of the Safe Harbor Water Power Corp., died unexpectedly on Wednesday, October 22, at the age of 49.

A graduate in 1925 of the Georgia School of Technology with a B.S. degree in electrical engineering, Mr. Gunn joined the staff of the Byllesby Engineering and Management Corp. in Pittsburgh, Pa., and was later employed by the Duquesne Light Co.

He became affiliated with the Safe Harbor Water Power Corp. as budget engineer in 1930, receiving successive promotions until 1947 when he became vice president and chief engineer of Pennsylvania Water & Power Co., sister company of the Safe Harbor Corp. At the time of his death, Mr. Gunn was vice president of Penn Water and held engineering responsibilities with Safe Harbor. He was also a member of the EEI Depreciation Accounting Committee, American Institute of Electrical Engineers, and the American Society of Civil Engineers.

Eleven Companies Join Dow-Edison Nuclear Study

THE participation of 11 more companies in The Detroit Edison Co. and Dow Chemical Co. joint project on the development of a nuclear reactor to produce electric power has been authorized by the Atomic Energy Commission. Under a joint contract with AEC, Detroit Edison and Dow Chemical have been working together on a commercially practical reactor since 1950.

The 11 companies are The Cincinnati Gas & Electric Co.; The Cleveland Electric Illuminating Co.; Consolidated Edison Co. of New York, Inc.; Consumers Power Co.; General Public Utilities Corp.; New England Electric System; Philadelphia Electric Co.; Public Service Electric and Gas Co. of New Jersey; The Toledo Edison Co.; Vitro Corporation of America; and Wisconsin Electric Power Co.

Most of the work of Detroit Edison and Dow, estimated at about $275,000 in direct costs, not including overhead, will be carried out in their own laboratories, according to AEC. To assist development of the project, the associated companies will provide qualified personnel who, in most instances, will have had previous experience in some phase of atomic energy problems. Each company will assign one or more men to function as regular employees of either Detroit Edison or Dow, and security clearances will also be granted to a limited number of engineering and management executives of the associated companies.

With the approval of AEC, other companies that can make a contribution to development of the project may become affiliated with it. However, should more companies than can be practically accomodated in the Dow-Detroit project desire to participate in such study, they may become associated with other existing study groups or create new ones.

The other study groups, of which there are three, are comprised of the Monsanto Chemical Co. and Union Electric Co. of Missouri; Commonwealth Edison Co. and Public Service Co. of Northern Illinois; and Pacific Gas and Electric Co. and Bechtel Corp.

EEI Prize Awards for 1952

Available to electric light and power companies, groups of their employees, and individual employees, the following Prize Awards, consisting of 39 presentations, are being offered through the Edison Electric Institute for the year 1952:

THOMAS W. MARTIN AWARD

Offered to company contributing most to rural electrification and agricultural advancement in area served.

An Engraved Bronze Plaque Naming the Winning Company.

Deadline: February 16, 1953

GEORGE A. HUGHES AWARDS

Offered for outstanding achievement in the field of electric appliance sales and promotion.

Ten Trophies and Cash Prizes Totaling $2,400.00.

Deadline: February 2, 1953

LAURA McCALL AWARDS

Offered in recognition of outstanding achievement and originality in the field of home service.

Five Bronze Plaques and Cash Prizes Totaling $1,000.00.

Deadline: February 2, 1953

PLANNED LIGHTING AWARDS

Offered to companies which have most effectively raised the standard of lighting in their communities.

Seven Bronze Plaques and Cash Prizes Totaling $1,050.00.

Deadline: February 16, 1953

FRANK WATTS AWARDS

Offered to companies most successful in stimulating promotion and sale of electrically operated farm equipment.

Four Bronze Plaques and Cash Prizes Totaling $850.00.

Deadline: February 16, 1953

GEORGE WESTINGHOUSE AWARDS

Offered in recognition of outstanding performance in the promotion of electric laundry equipment.

Two Bronze Plaques, Two Trophies, and Prizes Totaling $800.00.

Deadline: February 2, 1953

MORE POWER TO AMERICA AWARD

Offered to recognize achievement in increasing American industrial productivity through industrial electrification.

Two Bronze Plaques and Cash Prizes Totaling $500.00.

Deadline: February 2, 1953

CLAUDE L. MATTHEWS VALOR AWARDS

Offered to honor acts wherein extraordinary courage was exercised to maintain or restore electric service.

Bronze Medals and $150.00 Awards to Winning Individuals or Groups.

Deadline: February 2, 1953

REDDY KILOWATT ANNUAL REPORT AWARD

Offered to encourage companies to simplify, dramatize and humanize their annual reports.

Certificate and Bronze Plaque to Winner Plus Honorable Mentions

Deadline May 11, 1953

Complete details on contest rules and regulations may be obtained by writing to:

EDISON ELECTRIC INSTITUTE

420 Lexington Avenue New York 17, N. Y.

Accident Prevention Committee Meeting

W. F. Brown, *Chairman*

THE late summer meeting of the Accident Prevention Committee was held at the Sheraton Hotel in Rochester, N. Y., on September 15-16, 1952, with 57 persons in attendance. The committee's roster for the coming year includes ten new members who were introduced to the group's activities at this meeting. To insure successful completion of the numerous Accident Prevention Committee activities, each member has been given at least one assignment, while many members will assist with two or more projects.

The meeting was highlighted by subcommittee progress reports, round-table discussion topics, safety-training equipment demonstrations, an accident-prevention equipment display, and a film presentation on hot-line tool work.

The first day's session was introduced by R. E. Ginna, Executive Vice President of the Rochester Gas and Electric Corp. The luncheon meeting of the same day was addressed by the President of the local company, Alexander M. Beebee, who spoke on the subject of "Safety First, Last, and All the Time." Mr. Beebee pointed out the vital service that an effective Accident Prevention Committee can perform for individual companies, their employees, and the American way of business. Although real safety progress has been made, Mr. Beebee expressed the opinion that too many failures still occur on the part of not only the individual employee who suffers the physical effects of an accident but also every member of the organization above the accident victim. Chains of events that result in accidents must be broken. Mr. Beebee reminded the group that it does have the support of top management and that the burden of reducing the accident rate in the electric utility industry rests squarely upon safety directors.

The Accident Prevention Committee effectively compiles statistics on the accident experience of the industry to ascertain what progress, if any, is being made in improving accident rates. The results of a survey covering the first half of the current year were presented by R. W. White, indicating the accident experience of the companies represented on the committee. The survey showed a frequency rate for the first six months of 1952 that was 1.5 per cent poorer than the rate during the corresponding period in 1951. The severity rate had also increased 17 per cent, while the performance index was up 15 per cent. The rates reported by Mr. White for the first six months of 1951 and 1952 were as follows:

	First Six Months 1952	*First Six Months 1951*	*Comparison 1952 vs. 1951*
Frequency	9.48	9.34	1.5 per cent worse
Severity	1.04	0.89	17 per cent worse
Performance Index	220	191	15 per cent worse

Based on the performance of the first six months of 1952, it is predicted that the following experience will be realized by the entire industry for the current year:

- Frequency rate predicted at 11.17—up 1 per cent
- Severity rate predicted at 2.10—up 5 per cent
- Performance index predicted at 311—up 3 per cent
- Deaths predicted at 157—up 1.4 per cent

The committee is determined that the unfavorable accident rate trend indicated by Mr. White's report will be reversed during the latter half of 1952.

W. F. Brown reported on an activity of the committee that calls the attention of chief executives to the accident-rate standing of their companies compared to others of similar size. Each year a set of bar charts is prepared on which each reporting company's rates are illustrated in comparison with other company's. These charts are sent to chief executives and safety directors. It is felt that this activity stimulates executive interest in the problem of accident prevention.

E. J. Kreh reported on the success of the summertime hazards project. Realizing that the major portion of electric company accidents occur during the warm-weather months, the committee has endeavored to attack this problem by preparing special posters, leaflets, and letters for line-crew leaders, calling attention to hazards particularly common in the summer. The leaflets are of pocket size and intended for distribution to linemen. During the summer of 1952, approximately 38,000 posters were sent out, 215,000 leaflets were distributed, and 60,000 crew-leader letters were given to crew foremen to encourage increased efforts in preventing warm-weather accidents. The committee feels that this project is effective, and a similar program will be prepared for the 1953 season.

The Rubber Protective Equipment Subcommittee, under the direction of I. R. Dohr, will undertake a survey to determine current practices regarding the use of rubber equipment. This review will succeed a similar survey of seven years ago. Upon the decision of the committee, the Rubber Protective Equipment Subcommittee will take steps looking toward the development of standards for light-weight rubber gloves, low-voltage gloves, and hard hats for linemen.

A recent survey concerning the effectiveness of linemen's rubber sleeves has focused the attention of the committee on the importance of this equipment in the reduction of electric shock and burn accidents. The committee resolved to recommend that a mandatory rubber-sleeve rule be adopted by electric utility companies.

The Safety Training Subcommittee, under the chairmanship of J. G. Dickinson, has prepared the first booklet in a series of training manuals. Entitled "The Place of Safety in the Selection and Training of Employees," the new manual was approved by the committee and will be made available in the near future.

The round-table discussion period was conducted by A. F. Randolph, who is the sponsor of this activity. One of the outstanding events of the meeting, the discussion dealt with topics sent in to Mr. Randolph prior to the meeting date. The exchange of information occasioned by the round table has proven to be one of the most important of the committee's activities and

tends to standardize safety practices among the companies represented on the committee.

G. J. Ruoff, sponsor of the committee's *Accident Exchange*, distributed copies of the Fall issue of this bulletin to committee members and guests. The *Exchange* reports on accidents that have occurred in the electric light and power industry and details corrective measures to prevent their recurrence. Mr. Ruoff also displayed and discussed several items of accident-prevention equipment, including hard hats, rubber protective coverings, and voltage testers.

E. S. Licht demonstrated a model series-street-lighting set-up that is used for training purposes in his company. By means of the model equipment, hazards incident to line work on series lighting circuits can be pointed out.

A motion picture, presented by A. S. Hancock and other members of the Long Island Lighting Co., concluded the meeting. Originally produced by the company for an AIEE convention, the film depicted a Long Island Lighting line crew working on a 13.2-kv energized distribution system with hot-line sticks and showed linemen installing line breakers, changing a transformer and a defective crossarm, and replacing a defective pole. The safety record of the Long Island Lighting Co. for work on hot lines of 13.2 capacity has not been marred by a lost-time accident for six years.

Prime Movers Committee Meeting

G. V. Williamson, *Chairman*

MEMBERS and guests of the Prime Movers Committee convened in New Orleans on October 5 and 6 for their early fall meeting. Highlighted by subcommittee reports and a round table discussion that included over one hundred topics, the two-day meeting was well attended, with many guests from southern companies present. Because of the unusually large number of round table discussion problems submitted for consideration, other committee activities were confined to a minimum of time. The committee was welcomed to the City of New Orleans by the President of New Orleans Public Service Inc., George S. Dinwiddie, who recalled the history of his state and appropriately keynoted the meeting by pointing out the role of private electric companies in making this country great.

The Boiler Auxiliary Subcommittee, under the chairmanship of G. S. Gethen, has investigated the practices of steam generating plants with regard to water gage glasses on boilers. Data covering 256 high-pressure boilers indicate that approximately $1,000 per gage glass is being spent each year for maintenance. Recently the Prime Movers Committee transmitted a resolution to the ASME Boiler Code Committee recommending that, for power boilers with steam pressures 900 psi or above, compensated remote level indicators be accepted as a permissible alternate for gage glasses for boiler drum level indication. The Boiler Code Committee published a case based on the Prime Movers Committee recommendation that appeared in the November issue of *Mechanical Engineering*, as follows:

> Case No. 1155 (Interpretation of Par. P-291)
>
> Inquiry: May compensated manometric remote type level indicators be used in place of the gage glasses specified in Par. P-291 for measuring boiler drum levels?
>
> Reply: It is the opinion of the Committee that two independent remote level indicators of the compensated manometric type may be used instead of one of two required gage glasses for boiler drum water level indication in the case of power boilers with all drum safety valves set at or above 900 psi. When both remote indicators are in operation, the gage glass may be shut off but shall be maintained in serviceable condition.
>
> The remote indicators shall not depend for operation upon any external source of energy. Connections to the drum shall comply with present rules Par. P-293 and P-320 for water columns and shall be completely independent of connections for other functions.

An interesting report was presented by C. A. Miller on recent repairs to a 60,000-kw turbine-generator at the Grand Tower Power Station. The repairs, necessitated by a broken section of shrouding, consisted of replacing the shroud section by welding. The defect in the machine's operation was detected by a slight increase in bearing vibration. A general discussion by committee members and guests indicated practices in the industry with regard to vibration indicators and allowable operating vibration. A considerable variance among company practices was noted.

The Public Service Electric & Gas Co. of New Jersey is using a radioactive isotope to locate restrictions in power plant tubing. A report prepared by W. R. LaMotte and H. Weisberg detailed how a restriction had been located in a superheater tube at the Sewaren Generating Station by this method. Thorium X was selected as the radioactive substance because of its availability and its harmless emission of alpha rays. The use of radioactive materials for this purpose will be of benefit to power plant operation.

E. H. Mitsch of The Cincinnati Gas & Electric Co. described the starting-up activities of the new Walter C. Beckjord Station.

A discussion of automatic tripping devices and the use of supervisory instruments in modern power plants indicates a trend toward the increased use of such devices. New turbine-generators of some companies are being installed with vibration warning and tripping mechanisms. High-temperature trips are also being installed in the thrust bearings of some machines. With the advent of central control systems and the use of skeleton crews, greater attention is being given to automatic controls.

J. E. Goodale reported on a repair program conducted recently at the Hell Gate Station of the Consolidated Edison Co. of New York, Inc., that involved the welding of turbine blades on a 160,000-kw turbine. Twenty-two blades that had broken off in the high-pressure element of the turbine were recovered and reinstalled in this unique project. Approximately three months of "down time" was saved by welding the damaged blading in this instance.

A portion of the round table discussion was devoted to experience of dust collectors in different plants and operating under different circumstances. Methods were detailed by several members of the committee for cleaning this equipment. Operating

procedures were reported that result in the most efficient performance of dust collectors.

Another interesting problem that was considered during the round table discussion period concerned materials used in deaerator-vent condenser tubes. E. C. Cawrse reported on data obtained at the Lake Shore plant on the life of tubes of various materials used in this capacity. Certain operating practices were pointed out that have improved the performance of deaerating heaters.

The round table discussion period afforded an opportunity for committee members and guests to exchange operating experiences and suggestions on coal handling and storing practices. Reports indicated that higher belt speeds for coal belt conveyors are being utilized in many plants. T. O. Thompson described tests conducted at the Port Washington Plant on nylon coal belt brushes.

Particular interest was evidenced in a discussion of the current status of studies concerning atomic power plants. The committee is closely observing developments in this field.

R. H. McCumber reported on damages to a turbine at the Russell Plant caused by foreign particles accumulating in the steam cycles during repairs to a superheater section. This discussion emphasized the necessity of preventing contaminants from being carried by the steam to the turbine units. Mr. McCumber's report initiated a discussion on practices of blowing out boilers and the use of steam strainers for turbine protection. It was noted that the use of fine screens is being adopted by several companies on starting up new installations or on returning repaired systems to service.

Practices with regard to overhaul periods for turbine-generators are being altered in some companies to increase the "between overhaul" time intervals, with intervals as high as five or six years being tentatively adopted. Because of the high costs occasioned by non-operating machines and because modern supervisory instruments accurately indicate the conditions of running turbine-generators, several of the companies represented on the committee are extending periods between overhauls until servicing is indicated by control instruments. There is also a trend to increase the service periods of boilers between overhauls.

Concluding the two-day meeting, D. W. Stewart of New Orleans Public Service, Inc., was host to the committee on a tour of his company's Industrial Canal Plant.

Transmission and Distribution Committee Meeting

J. A. Pulsford, *Chairman*

THE fall meeting of the Transmission and Distribution Committee was held on October 23 and 24 at the Hotel Adolphus in Dallas, Texas, with 160 members and guests in attendance.

At a luncheon on the first day of the meeting, L. E. Cook, vice-president of the Texas Power & Light Co., spoke on "Texas Type T&D."

Standards and Specifications

Subcommittee chairmen outlined progress in the development of standards and specifications, sponsored by E. K. Karcher.

W. P. Holben reported approval of revised TD-10, "Specifications for Rolled Steel Washers," which soon will be released for publication. Substantial progress is being made on proposed revisions of other existing specifications for anchor rods and eyenuts and eyelets and on new specifications for moulding staples, steel insulator pins with 1⅜-in. threads, expansion shields for galvanized lag screws and machine bolts, and insulated clevises.

W. L. Vest stated that a survey indicates that usage and interest in small rating, dual-element fuses is insufficient to warrant standardization at present. Work on the development of industry requirements for heavy-duty interrupting ratings of cutouts is under way and the development of standards for reclosers is proposed.

L. J. Jacobi announced that TD-100, "Specifications for Full-Length, Non-Pressure Preservative Treatment of Poles," has been released for printing. Good progress is being made on proposed specifications for Douglas fir heavy-duty crossarms and braces.

A report from R. J. Palmer indicated that EEI-NEMA street lighting equipment standards for poles; materials, finishes and tests; head and reflector interchangeability and open reflector mountings probably will be ready for issue during the first part of 1953. Other proposed standards for luminaire supports, film cutouts, and insulator heads are under preparation.

A new Subcommittee on Connectors for Underground Cable and Cable Accessories is being organized under the chairmanship of T. C. Duncan.

Safety

The Safety Group, sponsored by F. W. Nimmer, featured a panel discussion on the use of protective equipment at distribution voltages by R. E. Cargill, H. E. Hatfield, R. E. McCann, H. MacVaugh, G. D. Stevens, and T. D. Thomas. Discussion revealed that most companies set 5000 v as a top limit for the use of rubber gloves, while others go as high as 8320 v. The majority also require their use on secondaries. The consensus was that gloves are not needed with carefully maintained hot line tools under normal circumstances. Laboratory glove-testing practices vary considerably, with monthly tests being typical. However, regular air testing and visual inspection by linemen were emphasized as being at least equally important. Training and enforcement practices were described and means for improving the safety record of distribution department employees were discussed. Standard rules, procedures and materials, effective follow-ups to check conformance, tailboard conferences, and periodic property inspections were recommended as direct means of improving safety. In addition, constant reminders through safety meetings, contests, awards, and posters were considered effective in maintaining alertness.

Overhead Group

Problems associated with the expanded use of aluminum conductors occupied the major portion of the Overhead Group session, sponsored by C. E. Baugh.

Further discussion of standard sizes for overhead type, all-aluminum conductor above No. 4/0 revealed several divergent ideas. Consequently, it was agreed that committee preference will be reballoted with a choice among four series of preferred sizes. These are

an exact extension of the AWG numbered sizes, copper equivalent sizes approximating an extension of the AWG sizes, even circular mil sizes approximating an extension of the AWG sizes and a compromise arrangement of the latter two.

C. E. Baugh presented results of a survey of troubles with aluminum-to-copper connections in overhead systems. Replies received from 33 companies indicate that almost all of those who have not experienced trouble either have had less than two years' experience or use aluminum only in clean rural atmospheres.

F. W. Myers reviewed the basic problems associated with the use of aluminum conductors and suggested the need for a program to collect existing technical literature, test data and performance records, establish working limits with respect to temperature and tension, investigate the corrosion problem through the use of test stations, and prepare performance specifications for connectors and tools.

R. W. Sherwood outlined field experience with compression sleeves and summarized laboratory tests on interchangeability of different suppliers' tools and sleeves. Conclusions were that mechanical bolt cutter type tools for small conductors are excellent but that hydraulic tools need improved convenience and provision for use on energized high-voltage circuits. Need for greater interchangeability of tools, a universal coding system to match sleeves and dies, and standardization of sleeve dimensions also were stressed. O. A. Boyer discussed similar problems with non-tension tap splices.

On behalf of A. N. Shealy, F. McNulty presented a Pennsylvania Water & Power Co. film showing erection of a 230-kv steel tower line. An innovation was the use of sectional aluminum gin pole which could be transported in a half-ton truck and reduced erection time about 25 per cent below that required with a conventional gin pole.

Underground Group

M. W. Ghen, J. L. Cross, and F. L. Woods described features of proposed EEI-NEMA standards for secondary network transformers which have been redrafted following user comments and which will soon be sent to members for ballot. T. C. Duncan described the proposed companion standard for network protectors which provide for operation of transformer and protector as a unit.

D. C. Hawley, Underground Group sponsor, led a panel discussion of network loading practices.

M. W. Ghen stated that normal transformer loadings of 80 per cent are used in Pittsburgh to insure a maximum of 125 per cent, or 130 per cent allowing for phase unbalance, with one feeder out. Feeders are not normally removed for planned maintenance during peak load periods.

E. J. Hayes reported that slightly lower contingency transformer loadings of 120 per cent are used in the high ambient area of Fort Worth. Some forced air cooling is used and 16,000 kv of secondary capacitors have been installed to offset the reactance of the heavy air conditioning load.

T. C. Duncan stated that New York City networks are designed for second contingency transformer loadings of 130 per cent which means 70 per cent normal loading. Feeders are taken out for maintenance at any time except when this would create the second contingency. Second contingency cases now average over 100 per year on all networks. Experience has shown that individual network size is limited by the load which can be picked up after an outage.

H. E. Yeide stated that Washington networks are designed for first contingency transformer loadings of 120 per cent to 133 per cent. Feeders are not removed for maintenance during the day.

J. A. Pulsford presented actual transformer load data for New Jersey networks. Contingency ratings are determined from thermal characteristics, contingency experience, and maximum permissible ratings calculated to give the most economical transformer life. This is approximately 34 years.

Limited installations of aluminum underground cable were reported by T. C. Duncan and J. A. Pulsford. In New York 70,000 ft of 27-kv cable is in service and 85,000 ft of 350 mcm of secondary network cable is being installed. A small amount of 600 and 800-mcm, 4150-v cable and 350-mcm secondary cable is under trial in Newark.

General Engineering Group

The General Engineering Group, sponsored by W. M. Penney, covered a wide variety of topics.

A report on utility radio matters from W. C. Phillips noted adoption of a new licensing procedure, proposed rearrangement of allocations in the 456-megacycle band, new proposed limitations for use of 72—76-megacycle band, and continued consideration of channel splitting in the 30—50-megacycle band as a means of relieving rapidly increasing congestion.

C. Denison described benefits derived from installation of switched capacitors on distribution feeders. Reduced loading equivalent to at least a full year's growth was obtained, and system losses were reduced 0.1 kw or more per kvar of capacitors on the system during peak load. Time clock control is used on regulated feeders and voltage control on a limited number of unregulated feeders.

B. M. Gallaher reviewed problems of power supply for three-phase packaged air conditioner units in the southwestern area where air conditioning and associated hot weather sensitive loads account for about 25 per cent of total load. Conclusions are that no radical change in distribution practice or design is indicated. Voltage levels from 214 to 254 v are found in practice on nominal 120/240-v systems without warranting correction. Present practice of open-wye open-delta banks together with four-wire delta secondaries is considered sound. Some burnouts have been caused by single-phasing.

C. E. Baugh and R. N. Coe described power system damage resulting from the earthquake in California last July. Damage was small considering the severity of the quake and less than that incurred by an average storm.

Edward A. Wakeman

EDWARD A. WAKEMAN, retired Vice President of Pennsylvania Power & Light Co.'s Wilkes-Barre Division, died at his home in Wilkes-Barre, Pa., last October 10. He was 82 years of age.

Mr. Wakeman's record of service in the utility industry dates back more than 50 years. A native of Pembroke, N. Y., he became associated with the Batavia Gas & Electric Co. at the age of 19 and in 1908 joined the United Gas and Electric Co. as general manager.

Two years later he was employed by The Wilkes-Barre Co. in the same capacity and when this company was merged with PP&L in 1922, he was named manager of the newly created Wilkes-Barre Division. In 1936 he was advanced to division vice president, the position he held upon his retirement in 1941.

Personals

Justin R. Whiting, Chairman of the Board, Consumers Power Co., was elected President of the Association of Edison Illuminating Companies at its recent annual meeting in White Sulphur Springs, W. Va.

As President of AEIC, Mr. Whiting succeeds **Presley H. McCance,** President, Duquesne Light Co.

Donald R. McClung, Vice President in Charge of Physical Operations, Pacific Power & Light Co., has been named Executive Vice President, and **E. Robert de Luccia,** for the past year Vice President in charge of the company's Lewis River development program, has been appointed Vice President and Chief Engineer.

With the company since 1917, Mr. McClung was employed in various capacities, including assistant chief engineer, assistant general superintendent, and general superintendent, before being named vice president in charge of physical operations in 1948. Earlier this year he served as Director of the Materials and Equipment Division of DEPA.

Before joining Pacific Power & Light in 1951, Mr. de Luccia was Chief of the Federal Power Commission's Bureau of Power and had previously worked for Stone & Webster Engineering Corp. and the Army Corps. of Engineers.

F. C. Gardner has been elected Executive Vice President of Ebasco Services Inc. In addition, **K. W. Reece** has been elected Vice President in Charge of Engineering and Construction, and **W. H. Colquhoun** has been made Engineering Manager.

Mr. Gardner graduated from North Carolina State College, receiving the degree of Bachelor of Science in civil engineering. After working with several electric companies, he joined Ebasco in 1939 as head of the design and construction department and has been vice president in charge of engineering and construction since 1945.

Mr. Reece is also a graduate of North Carolina State College and has done graduate work at Columbia University in electrical engineering. A member of the American Society of Civil Engineers and of the Technical Evaluation Society of New York, he joined Ebasco in 1925 and has been engineering manager since 1945.

Mr. Colquhoun graduated from Rensselaer Polytechnic Institute and joined Ebasco in 1941 as an appraisal engineer, becoming assistant to the engineering manager in 1950 and assistant engineering manager in April, 1952.

Robert P. Liversidge has been elected Vice President in Charge of Electric Operations for Philadelphia Electric Co.

Mr. Liversidge graduated from Cornell University in 1932 and was employed by Philadelphia Electric the same year as an engineering assistant. Later assigned to electrical and gas distribution work, in 1942 he was advanced to the post of superintendent of the Barbadoes electric generating station and later served in the same capacity at the Delaware and Southwark stations. He was appointed assistant general superintendent of station operations in 1949, assistant manager of electric operations in 1950, and manager in March, 1952.

Mr. Liversidge is a member of the executive committee of the Pennsylvania Electric Association, the American Gas Association, the Pennsylvania Gas Association, and the American Society of Mechanical Engineers.

George N. Hawley, Assistant to the President, Southern California Edison Co., has been elected Vice President in charge of the Commercial Department, succeeding **Robert C. McFadden,** who has retired. **Joseph R. Brookshire,** Administrative Assistant, has been named Assistant to the President, replacing Mr. Hawley.

An alumnus of the California Institute of Technology, Mr. Hawley was employed by the Mitchell Contracting Co. and Westinghouse Electric Corp. before joining Southern California Edison in 1928 as an industrial heating specialist. He was appointed assistant new business manager in 1935, manager of industrial sales in 1938, sales manager in 1949, and assistant to the president in 1950.

Mr. McFadden, who has been with the company for 36 years, was appointed assistant vice president in 1945 and since 1949, when he was named vice president, has been in charge of commercial operations.

A graduate of the University of Michigan Law School, Mr. Brookshire practiced law in Detroit until 1949, at which time he joined Southern California Edison. He served as public relations assistant until 1951 and was named administrative assistant last year.

Appointments to the commercial department's general office staff have also been announced. **Henry C. Rice,** Sales Manager, has been promoted to Director of Sales; **Howard Hayes,** Advertising Manager, to Director of Advertising and Publicity; **A. L. Code,** Manager of the Credit and Claims Departments, to Director of Claims and Commercial Services; and **W. C. Drewry,** Commercial Supervisor, to Supervisor of Tariff Application.

Carl E. Arvidson, General Supervisor, Electric Production and Transmission, Consumers Power Co., has been elected Vice President in charge of production and transmission, succeeding **LeRoy L. Benedict,** who has retired after 33 years with the company. **Harry R. Wall,** formerly Assistant to Mr. Arvidson, has been named General Supervisor.

The appointment of **Edwin C. Wilkins,** Commonwealth Services, Inc., as Assistant Secretary of Consumers has also been announced.

With Consumers since 1924, Mr. Arvidson has filled various posts in power sales, distribution, general engineering, electric construction, and production and transmission. From 1947 to 1950 he served as general supervisor of electric construction and in 1951, after a year as assistant general supervisor of electric production and transmission, was promoted to general supervisor.

Mr. Benedict joined Consumers' production and transmission department in Grand Rapids in 1919 as assistant to the division superintendent, later becoming division superintendent. In 1945, he was named general superintendent of the department.

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and was elected a vice president in 1950.

Formerly with Commonwealth Associates, Inc., Mr. Wall joined Consumers last October. His utility career includes service with various companies, including The Cleveland Electric Illuminating Co. and Commonwealth and Southern.

Affiliated with Commonwealth Services and its predecessors during his entire career, Mr. Wilkins joined Hodenpyl-Hardy & Co. in 1922 and served successively as assistant secretary of the Commonwealth Power Corp., Allied Power & Light Corp., and Commonwealth and Southern. Upon dissolution of the latter firm in 1949, he was named to a similar position with Commonwealth Services.

E. R. Kropp, Assistant to the President, Union Electric Co. of Missouri, has been elected a Vice President, succeeding **Charles E. Michel,** who will serve as a special consultant to the company.

With Union Electric since 1923, except for three years service in the Navy in World War II, Mr. Kropp has served in various capacities, including assistant to the secretary and assistant secretary, and in 1948 was made presidential assistant.

D. D. Moffat, Jr., has been named to the new post of Assistant to the President of Utah Power and Light Co. Mr. Moffat joined the company in 1929 after graduating from the University of California. He subsequently served in personnel and sales capacities, becoming division sales manager in 1936. He gained experience in other phases of the electric business as rate engineer, research engineer, and staff engineer, and at the time of his recent appointment was serving as assistant to the vice president.

Harold E. Cody has been appointed General Superintendent of Lines of The Cleveland Electric Illuminating Co. to succeed **W. Earl Rader,** who recently retired after 43 years of service.

A graduate of Ohio Wesleyan University, Mr. Cody joined the company 26 years ago as a groundman in the lines department. In 1943 he was appointed superintendent of the company's Eastern district, and in 1950 was named assistant general superintendent of lines.

Mr. Rader began his career in 1909, after graduating from Ohio University, as a surveyman for the company. He rose to division head in 1911 and survey superintendent in 1920. After a three-year term as assistant to the company's assistant general manager, he became general superintendent of lines 15 years ago.

New Home Lighting Idea Book Published

A NEW booklet entitled *Your Home Lighting Idea Book,* which offers practical suggestions for planning home lighting and provides lighting equipment information for the consumer, has been prepared by the EEI Residential Lighting Committee.

Designed for present and prospective home owners, planners, and remodelers, the booklet illustrates and describes lighting ideas for the living, recreation, dining, bed, and bath rooms and offers suggestions for entrances, kitchens, garages, and workshops. Specific recommendations for all of the rooms show how minimum lighting standards can be maintained and, at the same time, how lighting can be used as a design element in home decorating.

Your Home Lighting Idea Book can be useful to electric companies in sales promotional efforts involving home shows, demonstrations, home calls, and home economics classes, as well as to architects, electrical contractors, and others in the building trades.

Consisting of 24 pages attractively printed in two colors with many illustrations, *Your Home Lighting Idea Book* is available from the Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

Making Electricity Do More and Earn More

(*Continued from page* 420)

our well" and practically do away with water pumping and water carrying. "Not that I particularly object to doing these things," said this remarkable man who happens to be blind, "but sometimes when there is a lot of this kind of work, it would be nice to have electricity as a hired hand."

This man has had electricity burst into his life as a great force for good. He has thus far only begun his career in the electrical era, and this realization has given him an appreciation of many applications which we now take for granted. There will come a time, however, when today's modern farm, using electric power in 10,000 to 50,000-kwhr quantities, will appear to be only a beginning, as this Texan's electrification seems now.

It is the leadership and commercial enterprise of the nation's electric companies that will bring that day more rapidly than any other force in farm electrification. We look forward to the wonders of electrically operated automatic factories and to marvels of electrical living in the home not yet imagined. So, too, will we see in the farm of tomorrow miracles of production brought about by electricity. We cannot distinguish them in detail as yet, no more than could the early pioneers of the industry see the clear outlines of today's achievements. But we must work toward the broad promise of the future with the same drive, the same faith, and the same confidence in our abilities as did our predecessors.

Evidences of our progress and initiative in the service of the people must be made so plain on every hand that even a blind man can sense them and identify them as the proper symbols of free-enterprise accomplishment. We must so strengthen our position of leadership in the American march of achievement that attempts to assail it will appear not only uncalled-for but ridiculous.

Nowhere is there greater opportunity for action towards this goal than in farm electrification. We have made a good start, but a start only, and there is no end in sight to the work to be done. Through continually greater efforts on behalf of today's farmer and through a growing educational companionship with young farmers-to-be, we can help to assure truly golden harvests in better living for all America.

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